DECEMBER 1960

Utility engineering section begins on page 39

Electrical South

SOUTHERN MAGAZINE OF ELECTRICAL CONSTRUCTION

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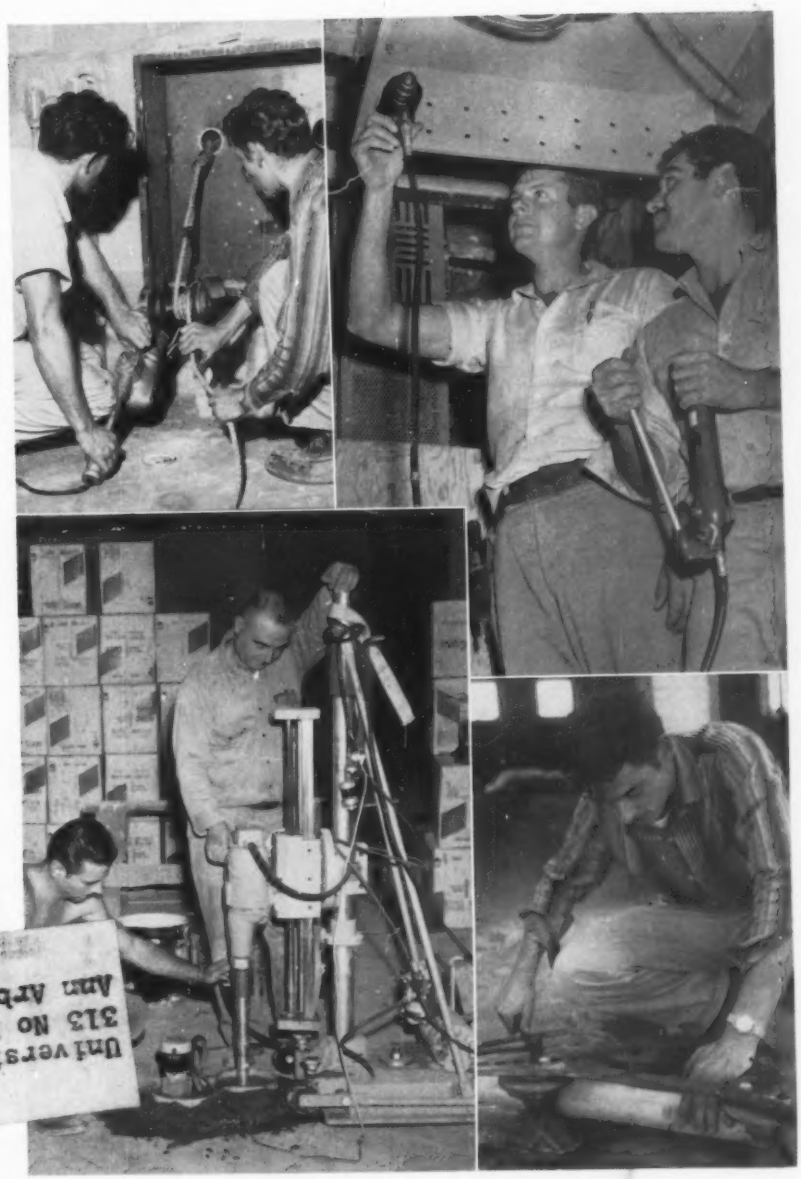

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Special section discusses time-saving tools and methods

See page 20

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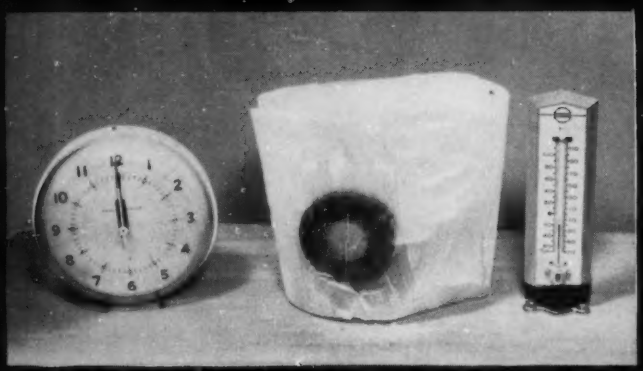

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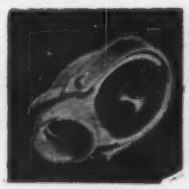
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Vol. 40, No. 12 Dec. 1960

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Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Major appliance industry suffers from low demand

For the past year, the major appliance industry has been in the economic doldrums, and many producers have been working on reduced manufacturing schedules. Not only has the replacement market been slow, but the failure of the home construction business to maintain a high level of work has prevented sales in this area.

One of the big innovations in the sale of appliances during the past decade has been the package selling of the entire home. Thus, when a buyer purchases a new house in a real estate subdivision, he acquires title as well to a host of appliances including dishwashers, disposalls, clothes washers and driers, dehumidifiers, and the like. The whole package is financed through the regular mortgage channels much as the heating equipment alone was financed in days gone by. This development has enabled the appliance makers to maintain strong distribution channels as long as there was no lull in home construction.

One of the big innovations in technique is that it has not only created mass markets for new appliances, but it has tended to speed up the obsolescence of older equipment. For example, a family moving into a new home equipped with all of the latest models of appliances will sell their old equipment even though it may still be doing a satisfactory job.

The purchasers of the second-hand equipment probably would not be in the market for new products because of the cost involved. The purchasers of the new home would not be in the appliance market unless the whole package could be financed at one and the same time. For this reason, two groups of customers have entered the economic scene where none were visible before.

There are other similar situations that can be traced where a vigorous housing industry can carry other businesses to prosperous conditions. For this reason, the increased availability of housing money should be a boon to the economy in the months ahead.

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

Economists foresee easing of home mortgage money

There appears to be no question in the minds of economists today that there will be an easing of home mortgage money. In fact, there is a definite movement on foot, bolstered both by the actions of the Federal Government and the commercial banking institutions, to make the flow of funds into home construction more liquid. The result should be apparent in the figures for new housing starts in the next six months.

Moreover, there is every reason to believe that the greatest attention, and action, will be given to homes in the moderate to low-priced levels where this column has repeatedly stated the real need exists. This is a move by financial authorities that has been under consideration for some time and is not the result of the impending change in national political administrations.

It has been no secret that economists have been worried about the lethargic condition in the home building field. Although every indication has pointed to a latent demand for better housing, for some reason or other building programs have been relatively static at depressed levels.

This condition has been felt in other segments of the economy as well for there are many allied industries and businesses whose success is dependent upon a healthy and vigorous construction industry. If the anticipated pickup in construction occurs, it could provide a tremendous boost to other businesses that have been in a state of recession for the past few months.

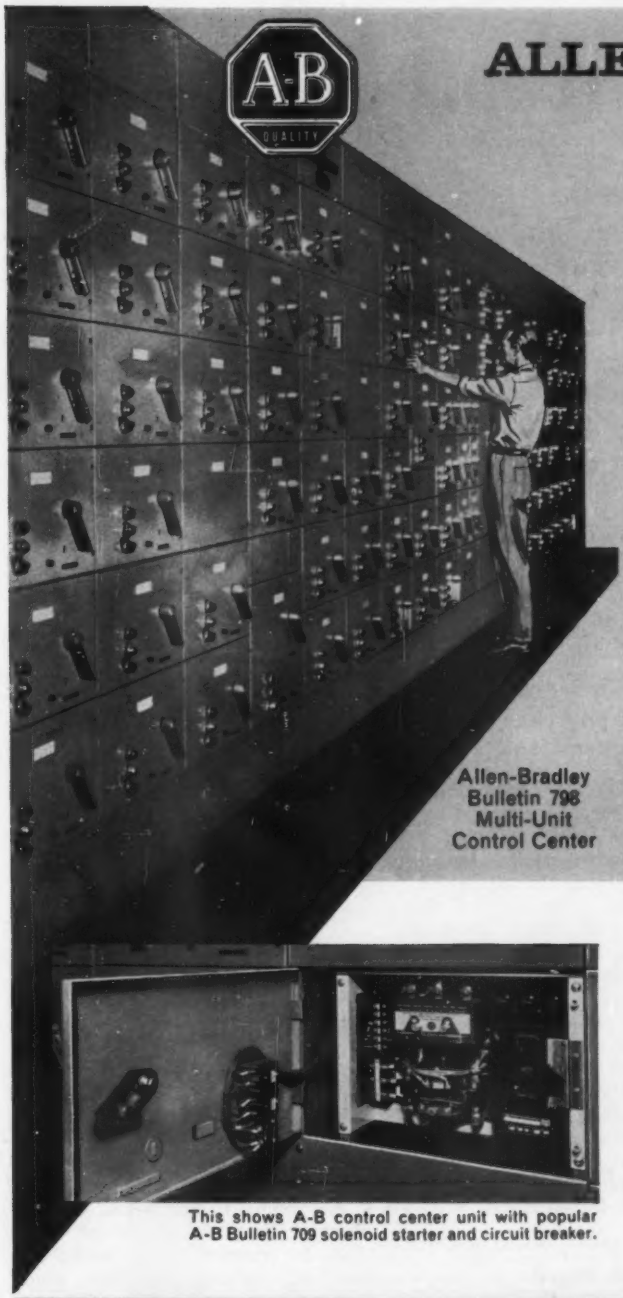
The mortgage situation for home construction is in reality in two parts. First of all, there is the problem of the availability of money and the willingness of lenders to supply funds for housing purposes. Here it is necessary for decisions to be made by the lending authority. If there is a restricted supply of money, what use can be made of available funds that will promote the greatest return on investment? In other words, the competitive uses of money must be studied as well as their safety and the duration of the investment itself.

In recent months, housing has not been a first choice use of money both from the point of view of income to the lender or from the possibility of turnover, which tends to increase the potential income from the lending operation. For this reason, the scarce supply of loanable funds of all types has tended to throw the weight of investment into other areas where more lucrative investment opportunities may be realized.

Interest rates still high

As more funds become available, there is usually a reduction of mortgage interest rates. In recent months, these have been either at, or close to, six per cent. To date, there has been no sharp reduction of such costs although it is reasonable to believe that they will decline as the supply of money increases.

Like other economic commodities, mortgage money bears a distinct relationship to its supply and demand. Usually a small decline in the interest rate does not produce a wholesale surge of borrowing for, during the early stages of this reduction trend, borrowers tend to wait to see how far the decline may go. Then, after feeling that the decline has stopped, the pressure for borrowing increases and home construction can proceed at a greater speed. It is for this reason that the increased supply of mortgage money can not be expected to increase construction immediately but will be reflected in building figures in the spring or early summer of 1961.



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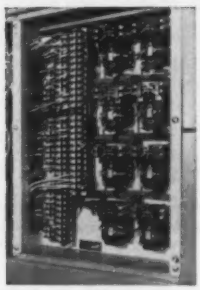
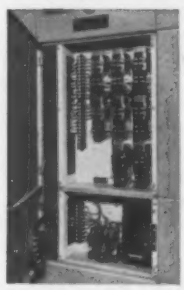
This shows A-B control center unit with popular A-B Bulletin 709 solenoid starter and circuit breaker.



This shows A-B Bulletin 700 control relays mounted in an A-B control center unit.



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Washington report

By Jack James

Digest of Washington news of special interest to the electrical industry

US Treasury to examine accounts more carefully

TAX DEDUCTIONS that you take next spring will be examined more carefully than ever before. With more money appropriated by Congress in the last session, the Treasury has hired new agents. The agents are auditing more accounts and scrutinizing them in more detail.

Small business men, and there are many in the electrical industry, might be hurt most by Treasury demands for details on expenses deducted from incomes. For detailed record keeping takes time that many small business men feel they cannot spare.

On large expense account items, however, Treasury agents will want better proof than a daily business diary that the items were for business. Business men might be called on to back up deduction claims or pay extra taxes.

This is the Yule season. Heavy spending on gifts, entertainment, and travel is customary. If you haven't been doing it, it wouldn't hurt to start keeping receipts now.

Safety booklet put out by Department of Labor

YOUR CUSTOMERS might appreciate receiving a booklet on electrical safety just published by the U. S. Department of Labor.

The booklet was written to be read and understood by the non-expert. It is called *Control of Electrical Shock Hazards.*

Most of the machines and power tools in U.S. industry are run by electricity, the booklet points out. Use of electricity for power, light, and processing is so universal that "we accept it with only an occasional thought of its ability to harm or destroy," the booklet says.

Topics include: how electricity acts, how shock occurs, typical electrical shock hazards, and methods for controlling hazards. Common unsafe conditions and acts are outlined.

You can get a single copy free from the Bureau of Labor Standards, U.S. Department of Labor, Washington 25, D.C. For copies in bulk, send 15 cents for each copy. Order these copies from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Journeymen's pay rises average 18.7 cents/hour

ELECTRICAL CONTRACTORS raised pay for union journeymen an average of 18.7 cents an hour during the 12-month period ending October 1, the U. S. Department of Labor reports. Average pay for union journeymen is now $4.04 an hour.

The rates range from $2.85 an hour at Raleigh, N. C., to $4.65 at Los Angeles, Calif.

The Bureau of Labor Statistics surveyed union wage rates in 100 major U. S. cities—about one third are in the South.

For all building trades, union rates are about 78 per cent higher than they were ten years ago, according to the Department.

National Joint Board backed up by Air Force

IT HAS BEEN reported that the U.S. Air Force is now requiring contractors subject to the National Joint Board for the Settlement of Jurisdictional Disputes to comply with Joint Board procedures or lose their contracts.

At Forbes Air Force Base an electrical subcontractor is reported to have given the job of running earth moving machinery to lay underground lines to members of the IBEW. The Operating Engineers Union appealed and won a decision from the Joint Board. The electrical subcontractor ignored the decision.

According to the report, at this point the Air Force told the subcontractor to follow the Joint Board's ruling.

The Air Force may take similar action in the future, according to the report, possibly going so far as to call for contract provisions that employers with union members subject to the Joint Board comply with Board orders.

This was the second jurisdictional dispute between the IBEW and Operating Engineers at an Air Force base in recent months.

Commonwealth Edison Co. aids electric heat study

RESEARCH whose results might help you sell electric heating for more homes and buildings has been underwritten by the Commonwealth Edison Co., Chicago. The electric heating field is so young that Commonwealth gave the University of Illinois funds in order to determine the relationship between the electricity used to heat homes and the calculated estimates. Ten houses will be used for study.

Apprenticeship programs pay, develop supervisors

THE TENNESSEE VALLEY Authority, which has operated apprenticeship programs for 17 different crafts since starting the first in 1937, says that apprenticeship programs not only pay but develop supervisors.

The 17 apprenticeship programs include electricity, sub-station electrical work, and construction and maintenance line work.

According to the TVA, a study showed that the value of work done by apprentices exceeded the cost of training. Another study showed that one quarter of the apprentice graduates advanced to supervisory positions.

Union can't call strike for pre-hire agreements

IT WOULD BE illegal for a union to strike to force an electrical contractor to sign a pre-hire agreement.

This is the substance of remarks by General Counsel Rothman of the National Labor Relations Board as applied to the electrical

(Continued on page 110)

first

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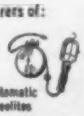

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LIGHTING PANELBOARDS — A 4-page descriptive folder featuring a line of plug fuse and toggle switch panelboards for lighting control circuits is now available from Frank Adam Electric Co., 3650 Windsor Pl., St. Louis, Mo. The folder includes box sizes, details of construction, wiring gutters, special features, and catalog numbers.

Write in No. D100 on card, pg. 17

CIRCUIT PROTECTION — A 24-page illustrated handbook contains suggestions for selecting the right kind of protection for electric circuits, motors, appliances and apparatus. Includes motor wiring diagrams and a complete list showing proper size fuses to use. Available from Bussman Mfg. Co., University at Jefferson, St. Louis 7, Mo.

Write in No. D102 on card, pg. 17

MODULAR LIGHTING—A twelve-page folder describing and illustrating their line of surfaced and recessed fluorescent modular fixtures is announced by Moe Light of Thomas Industries Inc., Lighting Division, Brook & Broadway, Louisville, Ky. Complete coefficient of utilization and candlepower distribution tables are included for each set of fixtures.

Write in No. D104 on card, pg. 17

MANHOLE HEATER — A four-page brochure issued by Morrison-Pelsue Co., 2001 S. Bannock St., Denver 23, Col., describes and illustrates applications of the MoPeCo Ventilating Heater available in several models, electrical or gasoline engine powered.

Write in No. D105 on card, pg. 17

HYDRAULIC POWER TOOLS—A new bulletin describing their two-speed, fast-approach portable power unit for hydraulic tools such as conduit benders, cable pullers, and pipe pushers is announced by Greenlee Tool Co., Rockford, Ill.

Write in No. D108 on card, pg. 17

CONDUIT WIREHOLDERS — A new information sheet describing their line of all-purpose conduit wireholders is now available from Knox Porcelain Corp., P. O. Box 2031, Knoxville, Tenn. The illustrated sheet gives installation information, design features, and specifications.

Write in No. D109 on card, pg. 17

LAMP GUIDES—Sylvania Lighting Products, 60 Boston St., Salem, Mass., has made available three lamp guides containing general information, technical data, and catalog listings on their lines of fluorescent lamps, incandescent lamps, and mercury lamps.

Write in No. D110 on card, pg. 17

PLUGS, RECEPTACLES — Two basic designs — explosion-proof and weatherproof—of Killark plugs and receptacles are fully covered in a new catalog section. This line offers many advantageous features, and is available in many styles and sizes to fit various boxes. Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis 13, Mo.

Write in No. D111 on card, pg. 17

ELECTRICAL DEVICES — Two publications, the pocket Federalog 111-PR and Bulletin 3-230, have been made available by Federal Pacific Electric Co., 50 Paris St., Newark, N. J. Complete details concerning circuit breakers, panelboards, fusible service equipment, safety switches, industrial motor control and lighting and power panelboards are contained in the 32-page pocket-sized catalog. The 8-page bulletin is devoted to the company's new line of QMQB fusible switches and panelboards.

Write in No. D112 on card, pg. 17

BUILT-IN HEATERS—Thermador Electrical Manufacturing Co., 5119 District Blvd., Los Angeles 22, Calif., has announced the availability of three new catalog sheets on their line of built-in electric heaters. The heaters described are their portable radiant-fan heater, electric ceiling heater, and baseboard electric heater.

Write in No. D113 on card, pg. 17

PRICE SERVICE—Specimen copies of the National Price Service price books are available on request from Henderson-Hazel Corp., 13601 Euclid Ave., Cleveland 12, Ohio. Please indicate whether you are a contractor or wholesaler. Each specimen includes a complete index, a representative sampling of completely illustrated price sheets, and information of special interest to those concerned with pricing electrical construction materials.

Write in No. D114 on card, pg. 17

FLUORESCENT FIXTURES—The new Miller Sabre fluorescent fixture is illustrated in the Sabre catalog, page 13, published by The Miller Company, Meriden, Conn. This page points out application, construction details, and dimensional, illumination, and installation data.

Write in No. D115 on card, pg. 17

CABLE SUPPORTING TRAYS—The Globe Co., 4000 South Princeton Ave., Chicago 9, Ill., has made available a new catalog on their line of cable supporting tray systems and accessories. The catalog contains information on design features, specifications, and installation.

Write in No. D116 on card, pg. 17

CENTRIFUGAL ROOF VENTILATORS—An 8-page, two-color folder (SDA-220) gives construction features, performance data, dimensions and recommended specifications for the new Centrifugal Roof Ventilator manufactured by The Peerless Electric Company, Warren, Ohio. Other important Peerless Fan and Blower products and a list of Peerless sales representatives are also included.

Write in No. D117 on card, pg. 17

ELECTRICAL FITTINGS—A 30-page illustrated catalog and price list of electrical fittings is now available from the Bridgeport Fittings, Inc., 209 Center St., Bridgeport, Conn. The catalog is loose-leaf type and contains complete ordering data for the wide range of fittings and devices in this line.

Write in No. D119 on card, pg. 17

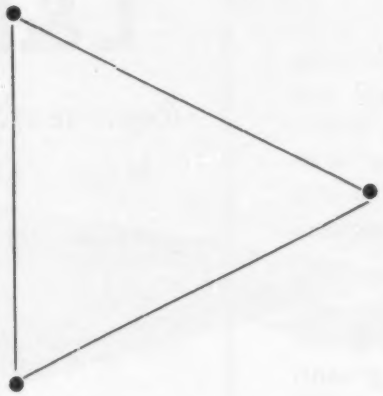
SPACE HEATING GUIDE—Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on a study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts and floor plan examples.

Write in No. D120 on card, pg. 17

CONNECTOR BULLETINS — Six new bulletins have been released by Ilsco Corp., 4730 Madison Rd., Cincinnati, Ohio. They cover the Ilsco line of solderless connectors, special connectors, lugs, neutral bars, crimp lugs, and the Ilsco Lok-A-Blok. The bulletins include descriptive material, dimension, and packaging data.

Write in No. D123 on card, pg. 17

TROFFER CATALOG—A 36-page catalog, with complete information on their newly re-designed architectural troffers has been released by Smithcraft Lighting Division, Chelsea, Mass. Divided into sections for selection of lighting units, the catalog gives complete illustrations and data for 1 and 2 foot troffers in all types of ceiling construction. Also included in the catalog is informa-



The Shortest Distance Between 3 Points

It's all too often a long, tough way to go from manufacturer to distributor to customer. But as manufacturers of L & P lighting fixtures, we have found that the shortest distance between these three points is, as always, the straightest . . . the straight line of mutual fairness and cooperation.

As manufacturers, we have found that we must be willing to give to the industry and to the community if we expect to prosper. We must, in addition, be willing to share with our distributors . . . to cooperate with their efforts fully, to give them complete and honest information about our products, and to give to them the same complete loyalty that we would like to have from them.

Our distributors, in turn, must be equally fair with their customers — for it is only through our distributors that we can reach these customers. Honest information, genuine assistance in lighting problems, ungrudging and complete service — both before and AFTER the sale — are still the basic grounds on which to build lasting success.

The theme of the recent meeting of the lighting industry in Las Vegas was "Partners in Business." We hereby re-affirm our pledge at L & P Lighting to be just that. No one manufacturer or distributor can achieve this alone. But it should mean enough to our entire industry to take this slogan seriously, and to work together constructively and fairly and honorably for the common good.

MURRAY REITER
President

L & P LIGHT & POWER UTILITIES CORP.

L & P LIGHTING

Olive Branch, Miss. • 1035 Firestone Blvd., Memphis, Tenn.

Distributed by Wholesale Dealers Only

No. 1 - - A Partner in Business

CLYDE V. HAMMON, L & P representative in Oklahoma and Kansas since early 1951, is a prime example of how well the theory of "partners in business" works in action. His own words reveal how completely he feels this partnership with L & P - - and with his customers.

CLYDE V. HAMMON

"Our agency, known as The Clyde V. Hammon Co., represents only reputable manufacturers of electrical products," he says. "At present, we represent only manufacturers of lighting fixtures, fluorescent ballasts, and electric heat. We sell to wholesale distributors only, who in our opinion are the most progressive type of businessmen."

"Our slogan is 'Not Price, but Service.' With this principle in practice, all of our customers are not only customers, but our friends as well.

"We recognize L & P Lighting as one of the most capable manufacturers in the lighting field. The personnel of this company from the top to bottom endeavor to manufacture a quality product at a fair price.

"We in the agency business must serve in a dual capacity. We must be fair not only in our dealings with our customers, but also with the manufacturers we represent.

"The American way of life has grown and prospered on fair competition and quality products. We recognize these principles and hope to grow and prosper by their application. In this way we expect both the distributors we sell and the manufacturers we represent to prosper."

LIGHT & POWER UTILITIES CORP. L&P

L & P LIGHTING

Olive Branch, Miss.

1035 Firestone Blvd. Memphis, Tenn.

Distributed by Wholesale Dealers Only

There's an

L&P

Representative Near YOU!

For further information and prices on L & P fluorescent fixtures—standard or "custom-made"—check the following list, and phone or write the L & P representative nearest you:

(F—Fluorescent)
(I—Incandescent)

Associated Manufacturers Agents (F)
900 Carondelet St.
New Orleans, Louisiana

James E. Clary (F - I)
62 Flicker
Memphis, Tennessee

Craig-Owen (F - I)
306 E. 11th St.
Chattanooga, Tennessee

C. V. Hammon (F - I)
845 S. W. 52nd St.
Oklahoma City, Oklahoma

J. F. Hisserich (F - I)
2001 Big Bend Ave.
St. Louis, Missouri

Howard E. Johnson (F - I)
2976 Randy Lane
Dallas, Texas

Allan M. Kahoe (I)
8849 25th St.
Metairie, Louisana

Irving Milow (F - I)
415 Clover St.
Rochester, N. Y.

Richard B. Murdoch (F - I)
7300 Bailor Ave.
College Park, Maryland

William B. Murray (F - I)
531 Western Ave., N.W.
Atlanta 14, Georgia

N. B. Nichols (F - I)
2509 Bishop
Little Rock, Arkansas

Joe E. Pearce & Associates (F - I)
50 N. Kenmore
Indianapolis, Indiana

Gerald Preacher (F - I)
116 N. Church St.
Lexington, South Carolina

Irvin Spero (F)
4142 Stillmore Rd.
South Euclid, Ohio

Arthur H. Swartz (F - I)
2120 Polk Ave.
Houston, Texas

Light & Power Utilities Corp. (F-I)
P. O. Box 157
Olive Branch, Mississippi

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new GUTH SURFACE MODULES

YOU PICK THE EXACT DESIGN YOU WANT...

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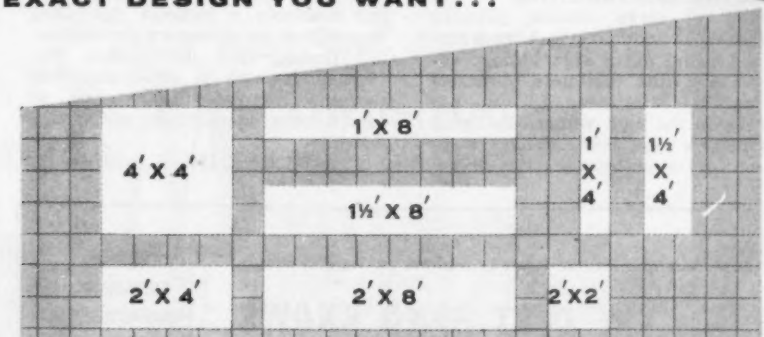
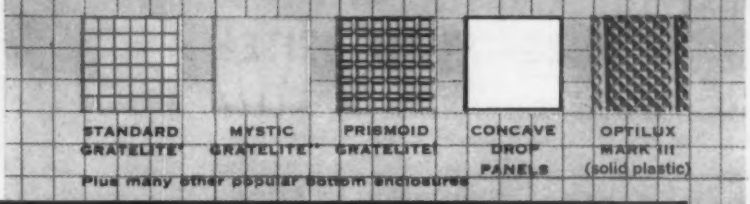
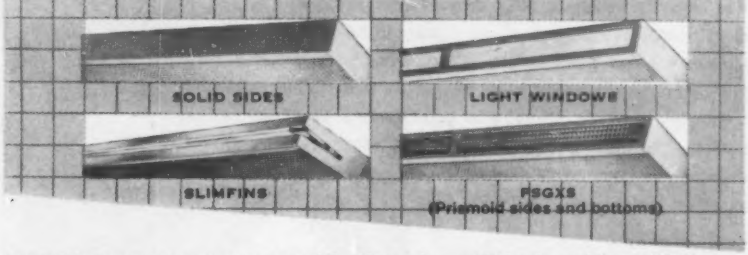


pick a **BOTTOM!**



Plus many other popular bottom enclosures

pick a **SIDE!**



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LIGHTING since 1902

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CAN. PAT. NO. 538,245
**Ⓡ U.S. PAT. NO. 2,927,200 & NO. 2,927,994
†Ⓡ U.S. PAT. NO. 2,904,673

DOZENS OF VARIATIONS! All slim, trim, efficient and beautiful! Quality construction. Bottoms are hinged ... and the hinges are hidden! Super rich, *Acrylic* white baked enamel finish. I.B.E.W. made and wired.

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CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

tion on ceiling lighting patterns, shielding designs, lighting techniques and applications.

Write in No. D126 on card, pg. 17

LIGHTING FIXTURES—Progress Manufacturing Co., Castor Avenue and Tulip Street, Philadelphia 34, Pa., announces the publication of two new lighting catalogs. "Lighting by Progress," a 52-page booklet, describes their line of residential fixtures. "Home Lighting by Minute Mount" is a 12-page bulletin illustrating new ideas in budget lighting.

Write in No. D131 on card, pg. 17

MOTOR CONTRACTORS — For control of large motors, primary switching of induction furnace transformers, and other high voltage applications, **Allis Chalmers Manufacturing Co.**, Milwaukee 1, Wis., has developed the **high voltage air-break contractors** (type 256A) which are described in a bulletin issued by the company.

Write in No. D132 on card, pg. 17

ELECTRICAL DUCTS — A brochure is now available from Johns-Manville, 22 East 40th St., New York 16, N. Y., describing their line of Transite electrical ducts. The two-color, 11-page, illustrated bulletin contains information on composition, methods of manufacture, applications, costs, and installation. Also included are shipping weights and dimensions of Transite conduit and Korduct.

Write in No. D133 on card, pg. 17

TRANSFORMERS—R T & E Corp., 1900 E. North St., Waukesha, Wis., has available a bulletin describing Terra-Tran transformers for residential underground distribution. The 15-page booklet is illustrated and contains complete information on construction, application, and design features.

Write in No. D135 on card, pg. 17

RADIANT HEATING — Ceilheat, Inc., 5212 Homberg Dr., Knoxville, Tenn., has announced the availability of a bulletin describing their line of concealed radiant home heating systems. The bulletin includes the principles of radiant heating, installation procedures, and advantages of this heating system.

Write in No. D138 on card, pg. 17

EXPLOSION-PROOF EQUIPMENT —"An Electrical Engineer Comes to Crouse-Hinds" is the title of a new 6-page folder by Crouse-Hinds Co., Syracuse 1, N. Y. The bulletin describes design and construction principles involved in manufacturing Crouse-Hinds Condulet electrical equipment for hazardous locations.

Write in No. D140 on card, pg. 17

RESIDENTIAL LIGHTING — A new catalog featuring their line of residential lighting fixtures has recently been issued by John C. Virden Co., 6103 Longfellow Ave., Cleveland 3, Ohio. The 48-page booklet is illustrated and in color. It pictures and describes incandescent and fluorescent fixtures for every room in the house and every design motif.

Write in No. D141 on card, pg. 17

HYDRAULIC EQUIPMENT—Truck Equipment Co., 3963 Walnut St., Denver 5, Colo., has made available a catalog containing information on their lines of hydraulic derricks, cable reel carriers, and diggers. It is illustrated and contains data on design features, specifications, and application.

Write in No. D142 on card, pg. 17

WATER HEATING BOILER — Precision Parts Corp., 400 N. First St., Nashville 7, Tenn., has available a bulletin containing catalog information on their electric hot water heating boiler, diagrams of the boiler, and data on the advantages of its use. The boiler comes complete with water circulator and safety valve on models A through K.

Write in No. D143 on card, pg. 17

FLOOD LIGHTING STANDARDS — An 11-page booklet describing their line of flood lighting standards is available from Kerrigan Iron Works, Inc., P. O. Box 479, Nashville 2, Tenn. Contained in the booklet are catalog data, diagrams of the equipment, specifications, and suggested methods of wiring supply to floodlights, as well as other installation procedures.

Write in No. D144 on card, pg. 17

ATTENTION: Architects, Electrical Engineers, Contractors and Design Consultants

DESIGNERS
ENGINEERS
MANUFACTUPERS

THE LEFT HAND KNOWS
WHAT THE RIGHT HAND
IS DOING—AT STA-BRITE!

THE ULTIMATE
IN LIGHTING
FIXTURES

On the one hand we're manufacturing time-tested fluorescent lighting fixtures that meet your ordinary demands — from the simplest and cheapest to the most complicated and expensive...and on the other hand we're busy inventing revolutionary new things that we believe will be sincerely welcomed! (Wait till you see what's coming up — keep in touch!) And with all of our lighting fixtures, standard or revolutionary, we carefully conform to underwriter's, building code, and union requirements. The baked enamel on steel or aluminum, for instance, has been tested with great success by Pittsburgh Laboratories for quality, color retention, and adherence. And all fixtures are designed to harmonize, complement, and vitalize any decor where good taste...and good light...are basic requisites.

CALL ON US SOON.

Whatever your requirements in lighting homes, offices and factories — depend on STA-BRITE'S quality fixtures and experienced engineering staff.

Write on your company letterhead for Sta-Brite's 1961 Price List.

Red Throat
BM-21B
½" Connector
BM-22B
¾" Connector
BM-23B
1" Connector

BM-41
½" Coupling
BM-42
¾" Coupling
BM-43
1" Coupling

BM-51
½" Offset Connector
BM-52
¾" Offset Connector

BM Offset Connectors showing how wires are guided over box edge.

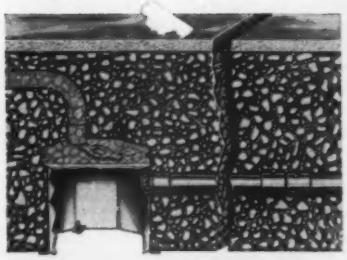
FOR MORE PROFITS

Save time and money with

B-M ORIGINAL INDENTER FITTINGS

Here is the combination that is unbeatable when it comes to easier E.M.T. installation at less cost. New lightweight plier size indenters make setting up thin wall conduit a breeze. B-M fittings are neater too! No unsightly nuts or projecting set screws.

A few more of the plus features of B-M fittings are Concrete tight—Vibration resistant—Extra heavy bright zinc plate, salt spray and acid drip tested for corrosion resistance—Extra heavy positive bonding locknuts—smooth rounded edges or bushed throat type connectors that prevent insulation damage—All steel construction with extra heavy gauge wall thickness.



ALL BRIEGEL FITTINGS ARE U. L. APPROVED AS CONCRETE-TIGHT

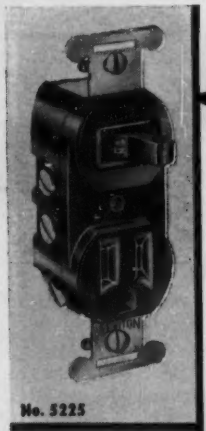
When setting E.M.T. in concrete you can make each job easier and more profitable by using Briegel All Steel Indenter Fittings that have UL approval as Concrete-Tight. Contractors everywhere recognize their cost cutting qualities and the fact that they make each wiring job a better job. It is only natural that Briegel Fittings are the most widely used E.M.T. connectors and couplings.

BM PLIER SIZE INDENTERS
BM—No. 607 ½"
BM—No. 608 ¾"
BM—No. 609 1"

All B-M indenter type fittings far exceed the requirements of U. L. file card E 10863 and Federal Specifications W-F-406.

BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

USED THE MOST FROM COAST TO COAST


No. 5225

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No. 5224

No. 5223 LB

Newest of the New!

FOUR SPECIFICATION GRADE COMBINATION QUIET SWITCHES

You've been waiting for!

LEVITON is the first to bring you four entirely new devices in the combination duplex line... the now popular mechanical Quiet Switch in combination with power outlets or pilot lights. The Quiet Switches are all precision-balanced with heavy special silver contacts, magnetic arc-snuffing action. The movement? So quiet you can hardly feel it!

The features? All these:

U-GROUND POWER OUTLETS offer maximum safety. Conform to N.E.C. requirements. Also accepts any 2-wire plug.

ALL POWER OUTLETS have bronze double-wiping contacts for longer life and pressure grip. Can be wired independent of, or controlled by switch.

PILOT LIGHT takes standard S-6 candelabra lamp that's easily unscrewed. Nickel-plated protective hood over lamp.

RUGGED CONSTRUCTION! Base molded of brown phenolic... covers of either brown phenolic or ivory thermosetting plastic. Heavy gauge rustproofed underslung steel strap is riveted through cover and body to form a permanent assembly.

EASY TO INSTALL! Large head No. 8 terminal screws have deep milled slots for easy wiring. Accommodate up to No. 10 conductors. Wiring diagram furnished with unit. Wide plaster ears on strap make wall alignment easier.

ECONOMY! Save installation costs and wall space—single gang box and wall plate are all that is needed.

No. 5225	No. 5222	No. 5224	No. 5223 LB
SINGLE POLE Quiet Switch with U-GROUND OUTLET	SINGLE POLE Quiet Switch WITH POWER OUTLET	TWO SINGLE POLE Quiet Switches ON SAME CIRCUIT	SINGLE POLE Quiet Switch with PILOT LIGHT
Rating Quiet Switch: 15A—120V AC only U-Ground Outlet: 15A—125V	Rating Quiet Switch: 15A—120V AC only Power Outlet: 15A—125V	Rating Quiet Switches: 15A—120-277V AC only	Rating Quiet Switch: 15A—120V AC only Pilot Light: 75W—125V

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LEVITON MANUFACTURING COMPANY, Brooklyn 22, N. Y.

Chicago • Los Angeles • Leviton (Canada) Ltd., Montreal

For your wire needs, contact our subsidiary: American Insulated Wire Corporation

CONNECTOR TOOLS—The Thomas & Betts Co., Inc., 72 Butler Street, Elizabeth 1, N. J., makes available catalog D59 including new compression connectors and installing tools recently developed. The tools are for use at usual distribution voltages and for "hot line" applications. New heavy duty tap connectors, double taps, stirrups and single sleeve ACSR tension splicers have many exclusive features and are designed to give high performance and easy installation.

Write in No. D145 on card, pg. 17

WIRING EQUIPMENT — An abridged catalog of industrial, commercial, and residential wiring items, gives all specifications for such wiring needs as switches, adapters, receptacles, and cord sets made by the Leviton Manufacturing Co., Inc., Brooklyn 22, N. Y. Designed for distributors and contractors, the catalog includes catalog numbers, prices, packing, weights, descriptions and indexes.

Write in No. D146 on card, pg. 17

ELECTRIC HEATERS—The new catalog of electric space heating equipment available from Meier Electric, 3525 E. Washington St., Indianapolis 7, Ind., includes complete details on the Meier Tandem Plug-In baseboard heaters, wall insert heaters, radiant heat cable, and portable units. Included in the brochure is the Meier's Heat Determinator, a simplified guide to electric space heating application.

Write in No. D148 on card, pg. 17

ELECTRICAL ENCLOSURES — Catalog Number 6061 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta 18, Georgia, is a well organized compact 132 page manual. The Catalog is divided into two distinct sections, one covering products for the Utilities, and the other section covering products for the Electrical Contractor. This Catalog offers complete descriptive information, prices, and specifications on all items in the B & C line of Electrical Products and Devices. Copies are available free of charge to Distributors, Contractors, Architects and Engineers, and Utilities.

Write in No. D149 on card, pg. 17

ELECTRIC HEATING—A 34-page descriptive packet containing color illustrations and complete specifications of eight major types of electric heating units and controls is now available from Arvin Industries, Inc., Electric Heat Div., 13th and Big Four Road, Columbus, Inc. Both radiant and fan-forced heaters are included, in wall, baseboard, and ceiling models.

Write in No. D150 on card, pg. 17

INFORMATION CENTER

BOOKLETS • NEW PRODUCTS • ADVERTISEMENTS

Help yourself to free literature and more details on any product mentioned in this issue.

Instead of writing a dozen different manufacturers for free literature and more information on products, tools, or services, just insert on the cards below the appropriate key numbers of the items in which you are interested. These cards may be used to get information on products mentioned in the following departments (see Contents Page for page number):

Catalogs and Bulletins — New Electrical Products
New Utility Equipment — Manufacturers' Literature

Be sure to print or write legibly your name and address—drop it in the nearest mail box and

ES pays the postage!

DECEMBER, 1960

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Electrical South
806 PEACHTREE ST., N. E.
ATLANTA 8, GEORGIA

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Electrical South
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ATLANTA 8, GEORGIA

THERE'S A REAL DIFFERENCE IN SAFETY-SWITCH SAFETY!

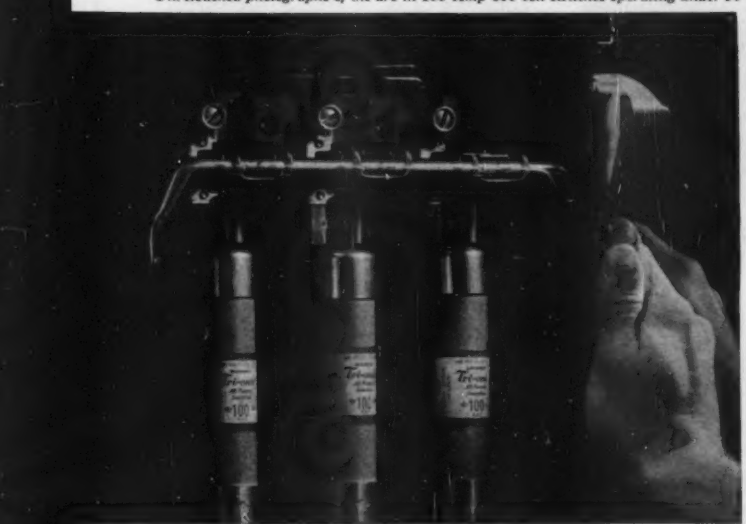
The *real* difference in safety . . . and the difference is *very* real . . . lies in switch performance under electrical load. You can spot this difference instantly when you compare the action of BullDog Vacu-Break® Safety Switches.

When you operate Vacu-Break Safety Switches under load, there is no blinding flash, no dangerous arc "explosion". The exclusive Vacu-Break design double-breaks the circuit, confines the arc within the enclosed switch head, smothers and extinguishes it instantly. Maintenance of contact points is virtually eliminated, and *you don't have to open the switch-box door to know the contact is broken.*

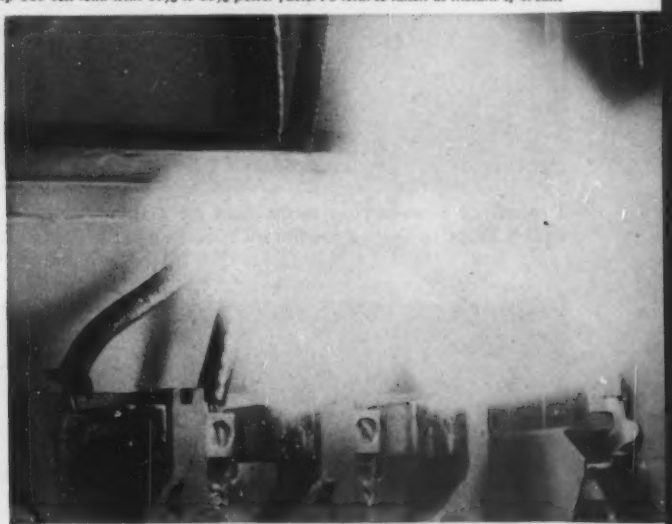
The operating handle is connected directly to the Vacu-Break heads. Push the handle "Off" and contact is broken positively every time. There are no toggles, triggers or springs to depend on. You know the switch is "Off" without looking.

Clampmatic® assembly gives clamped pressure contact, speeds "break". This means positive, safe operation, and long, trouble-free switch life. In safety switches, the *real* difference in safety lies in design and performance. Compare BullDog Vacu-Break Safety Switches with other types, and then *see* the difference!

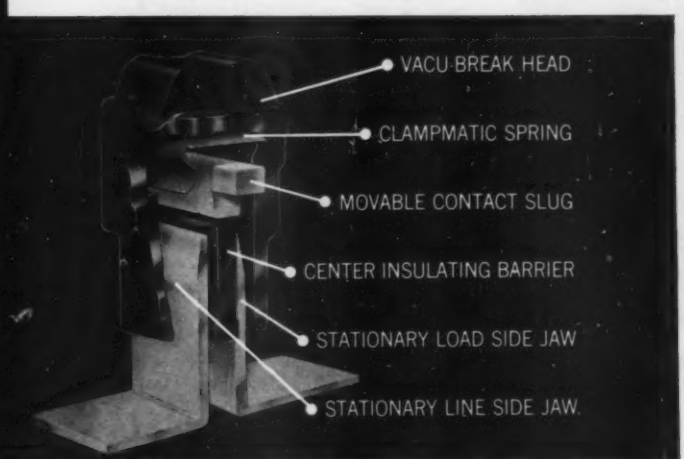
Unretouched photographs of the arc in 100-Amp 600-volt switches operating under 90-Amp 440-volt load with 40% to 50% power factor. Pictures taken at instant of break.



Vacu-Break Safety Switches confine dangerous, destructive arcs inside arc chambers, and smother them instantly.



Open knifeblade switches permit arc "explosions", burning and pitting contact points. The result—fire hazard and switch damage.



Cutaway of Vacu-Break switch head, showing movable contact slug inside arc-smothering closed chamber. Clampmatic spring assembly gives bolt-tight contact, speeds "break", increases switch life.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Michigan. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

For Safety's Sake—Buy Vacu-Break

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY

Consult the following Southern representatives:

Wilson Electrical Equipment Co.
3210 Garrow St., P. O. Box 1725
Houston, Texas

Wilson Electrical Equipment Co.
101 E. Maple Street
San Antonio, Texas

Standard Electric Mfg. Company
2401 Federal St., P. O. Box 1138
Dallas 1, Texas

Walker Electrical Co., Inc.
125 Bennett St., N. W., P. O. Box 2308, Station D,
Atlanta, Georgia

Proper selection, management of tools

Typical of time-saving tools used by Gabrio Electric is this wire cart, which helps to assure profits by speeding cable installations.

Contractor John Gabrio is keeping his job progress board posted. The organization has a goal of beating its past performance records.

By Harry J. Miller

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ "THE CONTRACTOR who realizes he needs a modern tool or piece of equipment, and doesn't purchase it, is paying for it anyhow!"

This declaration comes from John Gabrio, a highly-successful young electrical contractor who employs an average of 30 men, installs jobs ranging from $4,000 to $295,000, and does close to $900,000 a year in wiring contracts. He is a devout advocate of having the right tool for the job, along with specialized equipment for specific applications, even though such equipment may wait in his warehouse between jobs.

The St. Petersburg, Fla., contractor currently stocks a tool inventory worth about $11,000 and has a willingness to investigate any type of equipment which promises to save time and labor and increase profits.

He says tersely: "If men don't have the tools, they sure can't work—profitably, that is."

In Mr. Gabrio's opinion, the horse and buggy days are over for the electrical contracting business, even though some contractors may not as yet realize this potent fact. Today's contracting field—especially among its higher echelons and multi-thousand-dollar jobs, is a mature, technical business that needs desperately to keep abreast of modern developments in labor-saving equipment.

Efficiency counts

"Those contractors who can't or won't keep pace with the expanding industry are inevitably on the way to elimination by the competition. That has been the history of every other mature business or industry," says Mr. Gabrio. He

help contractor to operate efficiently

feels that the reason why some contractors prosper has no magic about it, and the reason why others fail is no mystery—because the facts are well known. Efficiency is at the bottom of both.

According to Mr. Gabrio, success often boils down to the contractor's viewpoint and policy with respect to having the right tools—in sufficient quantity—for the job, and in the hands of an adequate working organization. With them, the contractor eliminates the specter of business obsolescence, and bypasses the headaches of attempting to wring a sizable profit from his work.

Ample inventory a must

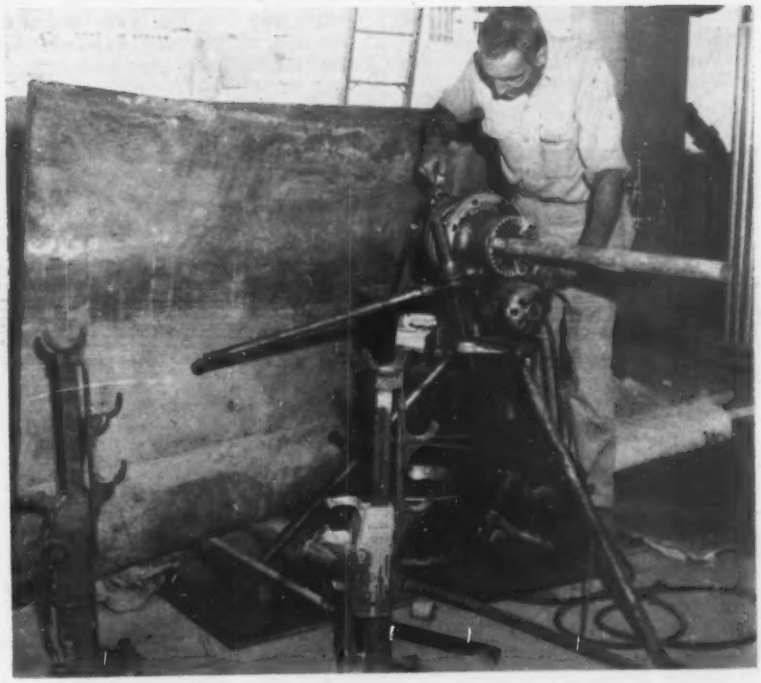
"In view of the keen competition for kingsize jobs, an ample tool inventory is a must if the contractor is to survive, which means he should overhaul his thinking with respect to the sound value of a tool investment fitted to the framework of his particular type of operation," says Mr. Gabrio. His view is that a contractor seldom has a surplus of tools and equipment, despite the fact that the decision to purchase new items isn't always easy, and almost every contractor has made purchases which he later regretted.

Says the St. Petersburg man: "Whether a contractor is exceptionally progressive or just a guy who wants to make a living from his business, he is constantly plagued by the problem of how to extract the highest margin of profit from every job.

"Good tools are one of his greatest assets. If his tool supply suffers from attrition, profits dive.

"The main concern in contracting, especially in performing the larger jobs, is to keep costs down. Since this implies cost control, which means being alert to any additional expense or eventuality that may arise after the job begins, this requires an evaluation of the job conditions from the standpoint of determining whether or not a tool purchase is justified—especially where it appears no foreseeable use for it exists upon job completion.

"Obviously, the number of tools



In the event that no electric power is available for a job, a gas-driven generator can be brought in by the company to avoid delays.

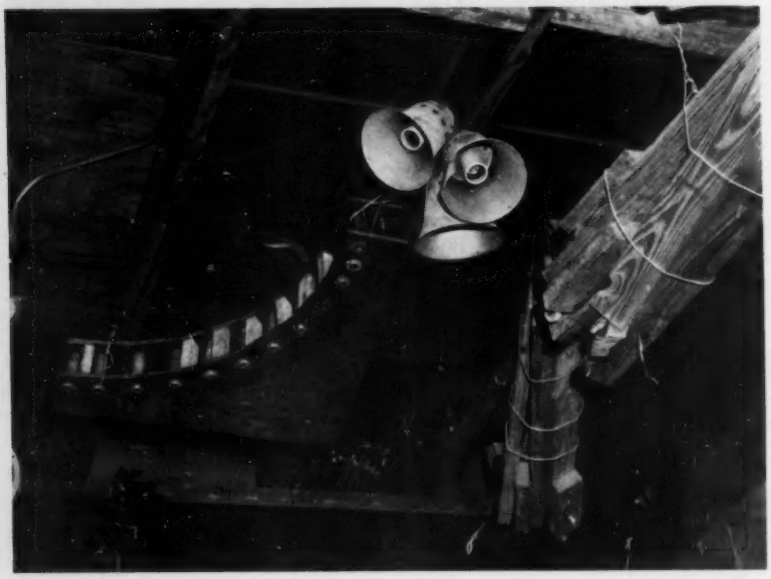
These hydraulic units will bend thinwall to two inches and conduit to five inches, help to save many hours on large contracting jobs.

and equipment vary with the job's requirements and sometimes the tool supply needed is much more for a small, complex job than for a job of greater magnitude, price-wise. A small job may require more pipe, more fittings, more equipment to route around, which means a more realistic tool expense has to be considered in bidding.

"For example, on a labor-only contract for $295,000 the tooling ran $4,000, because at job's end those tools were either lost, damaged through use, or so worn out as to be well nigh useless, and their value was negligible. We had no material for this job, so the cost of tool replacement had to come out of the labor. On the other hand, had that job been landed as one for which we supplied both the labor and the material, it would have run in the neighborhood of $600,000. But our tooling would still have been figured at $4,000, since we'd have made a profit on the material. Thus, since our over-all replacement for a year for existing tools runs $1,500, a job costing $75,000 would have an item of $150 tacked on to cover tool replacements.

"Since our annual business runs between $750,000 and $900,000, and we depreciate on an annual basis as legitimate operating expense, tools are pro rated according to job size. On a $75,000 contract, we'd normally figure $1,500 a year for replacement cost of tools and equipment, then that job would have to carry ten per cent, because that $75,000 job represents ten per cent of our $750,000 minimum gross."

The modest cost of a portable, compact, versatile power saw is a small price to pay to conserve workers' energy and speed up the job.



One Gabrio employee designed an oak quadrant fitted with pipe rollers which helps to feed interlocking armor cable into metal raceways.

Depreciation made yearly

Depreciation is made by the firm yearly, at the rates granted under federal tax statutes. All rotary equipment, such as power tools, portable lighting generators, welders (Gabrio owns two 400-amp units, one motor-driven, the other a gas engine type), pipe threaders, etc., are depreciated over a five-year term.

When he purchased a trenching machine for $1,300, it cancelled out its cost in 24 months' use. This unit was depreciated over a ten-year period because it doesn't get as constant use as other power units.

Mr. Gabrio uses a two-way radio communication hook-up with the local all-night telephone answering service.

The investment of $800 in a winch-equipped line truck makes cable pulling go easier and faster, and hiring it out to other crafts makes it self-supporting and self-liquidating. A $700 wire cart eliminates the laying of cable legs out on the ground. Where it is necessary to pull, for example, four 250-foot runs of 250 MCM cable, one 250-foot leg is pulled out on the first reel and cut, the other legs are pulled out, and then the four legs are tied together and brought to the machine for pulling. And if there's no electric power for the job, a gasoline-powered generator is brought up to avoid delay.

All tools are checked out from the warehouse to the job superintendent and the job through a tag system that pinpoints the whereabouts of each tool. Steel and woodburning branding irons

(Continued on page 109)

Tool policies bring contractor savings

By W. U. McCoy

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ A MAJOR OKLAHOMA CITY electrical contracting firm, Oklahoma Electric Supply Co., puts tool use and control high on the management check list. As a result, the firm's accountants can point to direct savings from tool policies.

"Any contractor who has not kept a record and a percentage of cost of doing work in regard to tools has not done himself justice," says E. Griffy, Jr., vice-president. "It's a pretty regular constant, and this item of cost is sometimes overlooked. And the more you break overhead down, the more likely you are to be accurate."

Oklahoma Electric Supply employs an average of 125 to 130 electricians, and during some seasons the total is over 200. Mr. Griffy says the most important thing when you have a large number of men working is to have an adequate amount of tools.

"Tools cost less than men standing waiting for tools," he says, "but, at the same time, you realize you don't have unlimited funds for tools."

So Mr. Griffy looks at the problem from two standpoints: the actual cost of the tools and the utilization of manpower.

Tools are checked out regularly. People dispatching labor for the firm have a memorandum ledger showing the location of tools. Superintendents on daily jobs must see that men have tools they need and check the tools back when through. Mr. Griffy pointed out some mechanics have a tendency to hang on to tools just in case they might be needed later, but this can force the contractor into a bigger investment.

"We check and investigate all tools twice a year, and we put them in top condition. Worn or dull tools cost money to operate."

Mr. Griffy has a decided viewpoint on tools themselves. "The test of tools is how nearly automatic they are. Tools that require a great amount of judgment may be good when one man is using them, poor when another is using them.

"We like tools anyone can use, and we stress portability."

Tools easily found

Oklahoma Electric believes in shelving tools where they can be readily seen. Most of the steel shelving used is only 12 inches deep, except for needed bins, drawers, and special tools. This tends to bypass the problem of having a tool "lost" at the back of a shelf.

"Big benders and the like you can see and don't readily lose, but the shallow shelving enables stock clerks to more readily see the tools at a glance."

Oklahoma Electric also has a history of developing certain tools as the need arises. An example of this was a special tool devised for installation of 4 by 4 and 2 by 4 lay-in fixtures on a major shopping center contract earlier this year.

Two rigs built

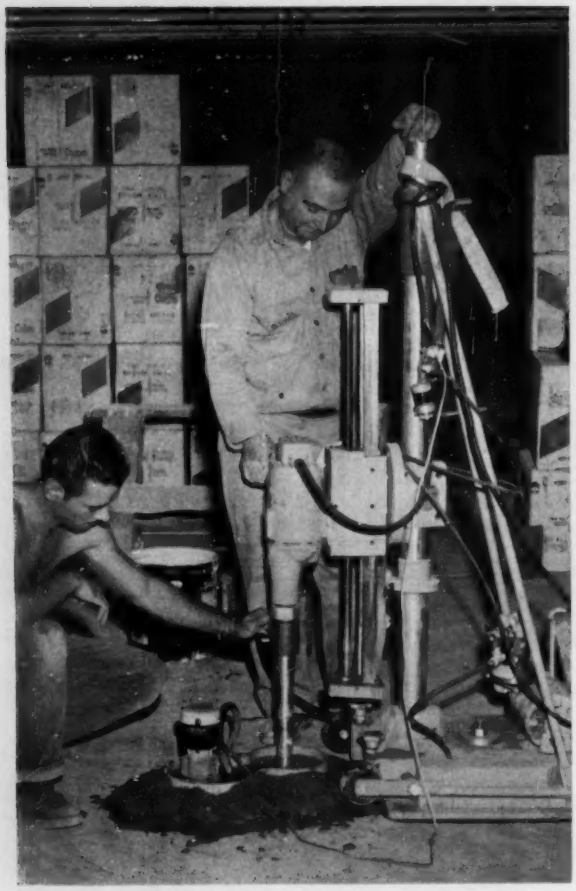
The firm had 1700 of these fixtures to install. Two special rigs were built which Mr. Griffy said paid for their investment five times on this one job. In addition to savings, the firm was better able to meet the completion date. Labor saving was placed at 50 per cent over a normal scaffold operation. With the two special rigs and only two men required per rig, the firm was able to install 100 fixtures a day.

The rig developed was a powered hoist which took fixtures from a rack and ran them up on a vertical track. A ball and socket swivel arm allowed the 80-pound fixtures to be angled through openings.

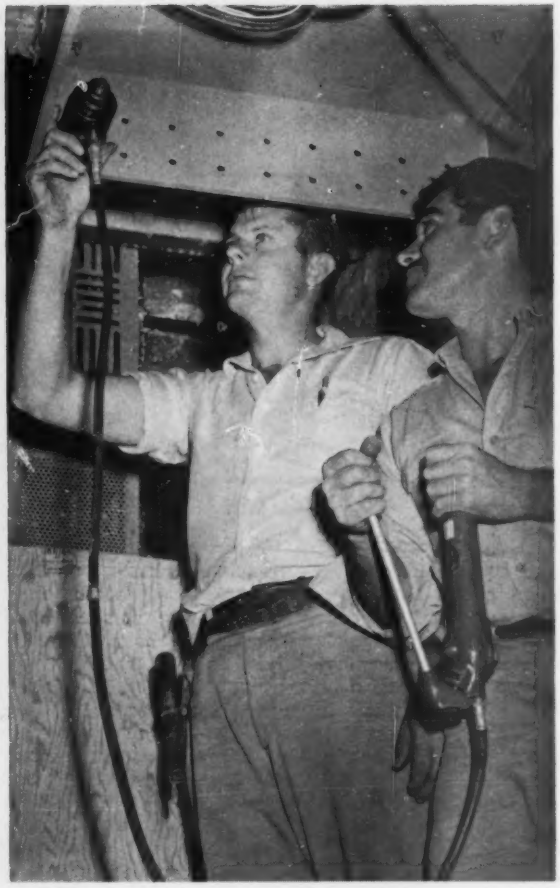
Two-piece unistrut was used, with rollers working on the frame. The vertical traveling piece was controlled by winch line and pedal, powered by a ¼-hp reversing type, single-phase motor. The up-

(Continued on page 109)

E. Griffy, Jr., vice-president of Oklahoma Electric Supply, has covered his office walls with photos of major projects in which tool management and labor saving devices have played strong roles in the firm's bidding position and completion date reliability.



These two men and the Vaco drill accomplish what would require 30 men to do without the machine.



Six of these knock out cutters are permanently assigned to a two-year store modernization project.

Power tools help young firm

By C. Thomas

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ "WITHOUT POWER TOOLS and timesaving equipment," said Danny Petersen, who, with his father, Carl, owns and operates Petersen Electric Co., El Paso, Tex., "an electric contractor just wouldn't be in business."

Comparatively speaking, Petersen Electric Company is a rather young firm, one outgrowing and surpassing itself every few months, and making money along its forward march.

"We confine ourselves to commercial jobs," said Danny Petersen. "The nearest we ever came to residential work was doing the multi-million dollar Foster Apartments, which includes retail shops and a restaurant for the convenience of tenants."

On commercial jobs of any importance or magnitude, the general contractor's interest isn't always in who's the low bidder. What the general contractor wants is to see the job move, not one subcontractor holding up the one behind him.

One of Petersen's current jobs is the expansion and modernization of the Popular Dry Goods Co., in El Paso. This is a multi-million dollar program which will be spread over a two-year period.

Difficult estimation

"Jobs of this nature," said Tommy Avant, Petersen's estimator, "are a masterpiece to figure. It's impossible to foresee the extras, or contemplate how often we will be shunted from one location in the store to another, after we've set up, in order that business as usual can continue."

A piece of powered equipment used on this particular job is the Core Lock Vaco drill, being used to go through six inches of reinforced concrete on the seventh floor. Attempting to do this in any other way would have been a

tedious and long drawn out ordeal.

"We go through six inches of reinforced concrete within five minutes, which includes the time to position the machine, and come away with a clean, perfect hole, and with no dust," said Job Superintendent Barney Claypool, "and we do it with two men. We couldn't have gone to the floor below and worked upward, for the store wouldn't have permitted closing the sixth floor."

This Core Lock Vaco Drill works on the principle of drilling rigs in the oil fields. Water is forced inside the drill casing which brings the cuttings to the surface. This eliminates the dust. And, as the name implies, the machine cuts a solid core. Each diamond-studded bit cuts 30 feet of holes.

$700 worth of bits

"Seven hundred dollars worth of bits was bought for this job," Mr. Claypool continued. "The bits cost from $150 to $200 each, depending upon their size. This will give you some idea of how many six-inch holes had to be cut. Imagine doing this with chisel, hammer, and muscle."

Exclusive of the Core Lock Vaco Drill machine, there is about $4,000 worth of power tools and timesaving equipment on this particular job, which employs 20 men.

No depreciation breakdown

"We keep no breakdown on tool depreciation," said the estimator. "The bookkeeping expense involved in keeping up with such details would amount to more than it's worth. At its best, it would give us data and figures, but no worthwhile information."

All tools and equipment are charged out, on a charge out sheet, to each individual job, and credited on their return. Lost, misplaced, and replaced tools go into the general overhead expense.

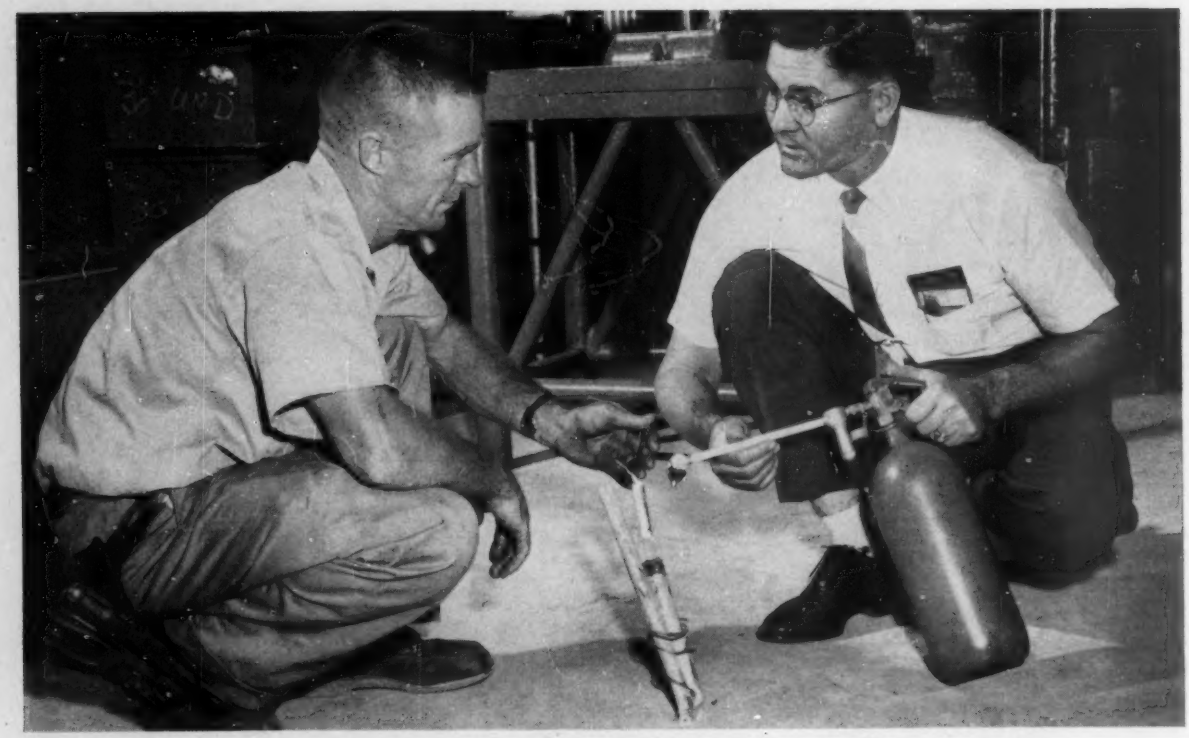
The only equipment that's ever juggled back and forth from one job to another will be those whose use can be scheduled, for example, the Core Lock Vaco drill and a wire puller.

But such tools and equipment as pipe vises, power pipe threaders, masonry drills, jar hammers, stud fastening guns, scaffolding, ram set guns, and knock-out cutters are permanently assigned to a job until its completion. There is always some hazard in moving equipment, and there is the expense of truck and driver, and the lost time.

(Continued on page 110)

Three lightweight aluminum scaffolds like this were bought for the store project. They can be set up and torn down by one man.

A portable power drive for threading pipe is another piece of equipment which has been permanently assigned to the store project.



A jet line cylinder gun is a handy tool, agree Contractor J. B. Stone, right, and Billy Hutchings.

Right tools speed job completion

By Wendell Givens

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electrical Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ When J. B. Stone, of Birmingham, Ala., embarked on his career as an electrical contractor, he scouted the industry thoroughly and reached this simple, solid conclusion: the contractors with the proper tools get the jobs, and get those jobs done faster and better.

As the Stone Electric grew, Mr. Stone—called "Jabo" by his friends and associates—acquired power tools and other time-saving equipment as rapidly as possible. Today, his company is one of the best equipped electrical contracting concerns in the South. It can handle any job, Mr. Stone asserted: commercial, industrial, or residential.

This, he hastens to explain, is not a blanket recommendation for purchase of every power tool on the market. "Each contractor," he said, "must of course assess his own needs and determine if he should, and if he can, acquire these tools. But our observation from the outset has been that if you want the big jobs you must be equipped to handle them."

Possession only the beginning

Again, Stone Electric is well aware that mere possession of such tools is only the beginning. Proper training in their use, an orderly system of storage and checkout, maintenance and repair, and assignment to jobs all are vital factors.

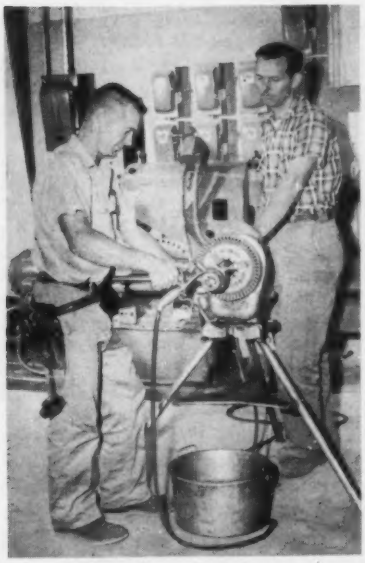
After acquiring power tools, a contractor should be alert to adapting them to his special needs, Mr. Stone asserted.

Of his company's array of power tools and equipment, he values four of special importance in saving time and expense: a hydraulic winch mounted on the front end of a Jeep, an aerial ladder mounted on a ¾-ton truck, custom designed scaffolding, and mobile radio equipment.

The four—along with almost every other power tool employed today by electrical contractors—were put to excellent use on a major installation just completed by Stone Electric: the new industrial plant of Transall, Inc., Birmingham, makers of conveyor equipment.

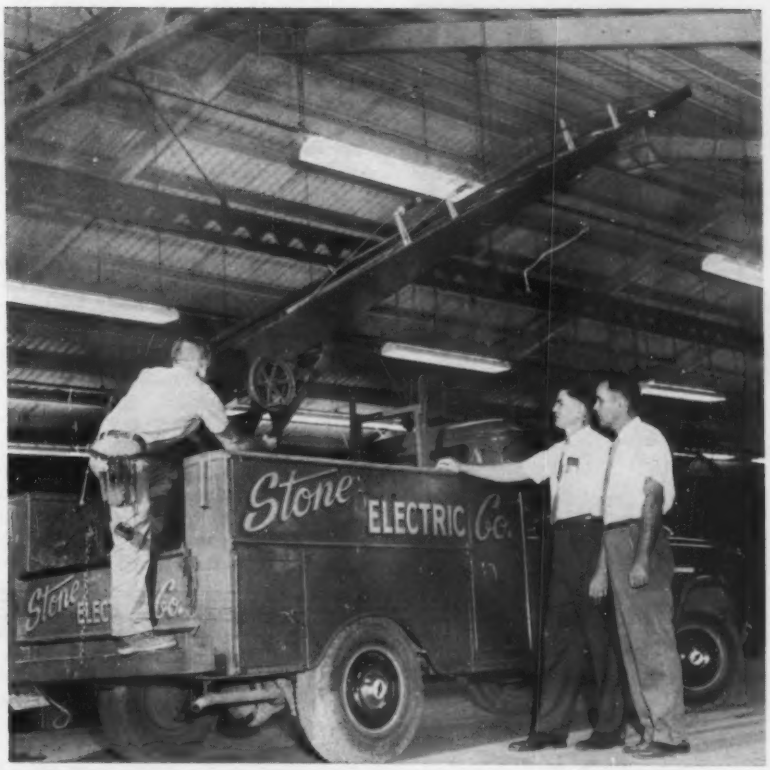
The 8,000-pound capacity winch on the Jeep was used to set all heavy equipment, including two banks of heavy transformers, and to pull all main service feeders. Setting the transformers required about 40 hours. With conventional tools the figure probably would have topped 100.

The winch, with power takeoff on the Jeep, also is used for setting



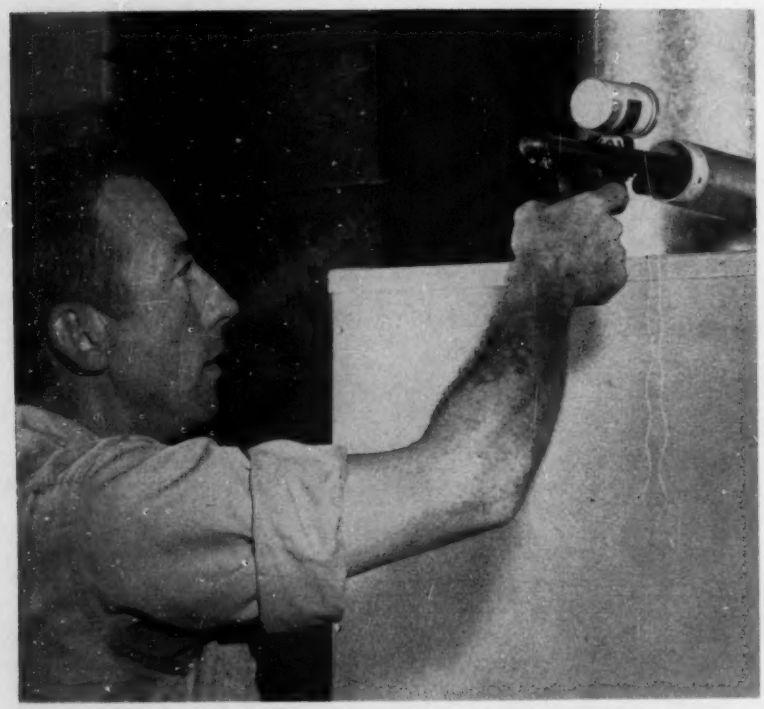
Power dies are four times as fast as the manual type, according to J. B. Stone, electrical contractor.

This front-end winch with power takeoff on the Jeep cut in half the setting time required for installing two banks of transformers. ►



Stone Electric's 30-foot aerial ladder moves in any direction to any height. Looking on as Billy Hutchings operates the ladder are Mr. Stone and H. W. Kite, general superintendent of the Transall plant.

This electric hammer, being used by Gene Horton, is eight times faster than manual hammering.



Use of this jet line gun enables Stone employee Tommy Ward to do a job fast, efficiently. Employees are trained to use tools safely.

Gene Horton uses a power saw on pipe, and is able to cut in four minutes what would ordinarily require about 15 minutes if done manually. Stone Electric stresses adapting tools to meet special needs.

poles and for other heavy work. Its advantages are many.

"On the Transall job," Mr. Stone related, "only three men were needed for setting the transformers where previously as many as nine would have been required. The winch cut setting time by half and provided continuous pull.

"We can drive the Jeep into almost any building. In cases when that is not possible, we can park it outside and use snatch blocks. Another obvious advantage is that we don't have to have access to an electrical outlet."

When Stone Electric is not using the Jeep-winch, it is rented out—with operator—to other contractors for $10 an hour. The original investment in Jeep and winch was $1,200.

Versatile aerial ladder

The aerial ladder is one of the most versatile pieces of equipment for Stone Electric. On the Transall job the truck was driven inside the plant and the 30-foot ladder used for installing fixtures on the 36-foot ceiling and other high-up equipment in the Butler-type building. Used instead of scaffolding, the ladder—which cost approximately $1,000—more than paid for itself on the one job. Mr. Stone figures the ladder will cut costs on most major installations by 25 per cent.

For convenience on street lighting work the truck can be parked to the side and the ladder turned in any direction, even out over traffic, if need be.

Mr. Stone designed his own lightweight scaffolding — 1-inch tubing compared to the customary 1¾- to 2-inch. He has three sets—one for small office work and two for industrial and commercial jobs. The lightweight scaffolding is more easily assembled, dismounted, and transported.

Radio equipment used

Stone Electric has had mobile radio equipment for two years and although no exact dollars-and-cents value can be placed on it, Mr. Stone is convinced it paid the original cost of $6,000 in a very short time.

"The radio saves many a mile for our trucks, facilitates movement of materials and tools, and enables me to be away from the office and at job sites much more. For example, if I have rush correspondence to take care of, I simply dictate letters by radio," explained Mr. Stone.

(Continued on page 108)

Moderation in buying tools saves money

By Jack Trovato

President
Trovato Electric Co., Inc.
Arlington, Va.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ OUR PURCHASE of tools and system of using them in our organization are always under close surveillance.

Our methods of purchase, use, maintenance, and control are subject to change every six months or so. The reason for this has been our rapid growth. Starting in business seven years ago, we have annually doubled our volume from $10,000 the first year to $600,000 last year. In order to have our profits grow apace with the increase in volume of work, we had to make every dollar spent justify its expenditure.

Multi-purpose tools sought

We approach the purchasing of tools with a degree of moderation. An oversupply of tools may mean wasted money. A tool used only 50 per cent of the time may get old and obsolete lying around the shop. On the other hand, a shortage of tools may spell wasted time in makeshift arrangements to get the job done. When to buy a tool and what tool is best for a job are problems every contractor faces.

We are very much alert to the multi-purpose tool or tools on which modifications can be made in order that they may be widely adapted to different uses. One tool we have found that meets this requirement is a power drive, which is light in weight and portable. With this we can thread conduit up to four inches.

With a slight adaptation we have pulled four 500 MCM cables into 3½-inch conduit in runs over

Location and duration of power tool use are recorded in a file.

An apprentice is taught to use the power drive in threading pipe.

200 feet long. This power tool is small enough so that one man can set it up at a distribution panel.

With one man at one end of the line and two men feeding in, the power drive will pull in cable at a rate of four to five feet per minute. Needless to say, there are other tools on the market than can do as well or slightly better. However, they may not be as readily adaptable to multi-purposes.

Stake body truck

Another tool we feel is multi-purpose is our 1½-ton stake body truck. It is in use constantly because of its adaptability to different tasks. It is the workhorse of our fleet. Equipped with a power winch, a removable A-frame, and outriggers, the truck is used for hauling anything from wirenuts to large transformers.

The bed of the truck is completely free of obstruction when the A-frame is removed. An A-frame can be set up by two men in five minutes, making it useful for setting poles. When the outriggers are installed, loads up to 2000 pounds can be picked up. The power winch not only picks up loads and sets poles but is also used in pulling in cables.

It proved extremely useful at the job we did on an 84-foot reflector building in Annapolis, Md., where we built 15 manholes, installed 5,000 feet of four-way concrete-encased duct, and installed a 300-kva substation. On this job every phase of its adaptability was used. By attaching a ladder, we can also use this truck for changing or installing pole light fixtures 25 feet above the ground level.

Decentralized control

We have found a system of decentralization working out most satisfactorily in tool distribution and control.

Our jobs run anywhere from $5,000 to $50,000. Currently we have about 30 jobs in process. We have one general superintendent in the office with three field superintendents, each taking care of about 10 jobs. The general superintendent coordinates the work of the three field superintendents. A card file listing our complete tool inventory shows which tools are in use at various jobs in progress.

Each field superintendent has a full complement of general use power tools for which he is responsible, such as a power drive, power mule, heavy wrenches, electric hammer, hydraulic benders, hydraulic punches, and other power tools in daily use. The field superintendent assigns these various tools out to the job foreman as the need arises, and they, in turn, are responsible to the field superintendent for the tool.

In this way, maximum use and efficiency are obtained from tools. Sometimes one field superintendent requisitions a tool from one of the other superintendents when need arises.

Special tools not in constant use, such as welding and cutting torches, are kept in the shop and records made when they are assigned to jobs.

Effective safety program

The test of the effectiveness of our safety program is evident in our record. Not a single mechanic has been hurt using a power tool in the seven years of our establishment.

The first to be instructed in the use of a new power tool is our field superintendent. Schooled in its hazards as well as maintenance, the field superintendent, through demonstrations and supervisory operation of the tool, passes on information to the job foremen. They in turn teach the mechanics and helpers.

Our tools are insured against theft. We have learned from our insurance agent that we are under the national average for electrical contractors on accidents of all types.

Buying most of our power tools from one company has proven another means of keeping informed on new tools coming on the market. The manufacturer's representative is immediately available on a job when any tool difficulty or problem arises, whether it is operation, maintenance, safety, or adaptability. Working closely with us in all phases of tool handling, he understands our conservative philosophy of moderation on multi-purpose tools.

Continuous record

We keep a continuous record of our tool inventory: first, for depreciation for tax purposes; secondly, for charging them to overhead on different jobs. For our mechanical staff, averaging 50 men, we maintain a $10,000 tool stock purchased over the years. Some of the tools have already paid for themselves on jobs we have completed.

The only tools we use in arriv-

(Continued on page 108)

Power tools:

By J. C. Harman

J. C. Harman and Son
Manassas, Va.

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors
- Industrial Engineers ✓
- Consulting Engineers

◆ POWER TOOLS and equipment hold a very important place in our operation. Power tools such as a jet gun, electric wire pullers, and power vises cut our labor time in half. A rolling scaffold and similar equipment save incalculable time and labor.

We would not be able to turn in a good competitive bid if it were not for our power tools. We would not be able to attract and hold topnotch skilled mechanics if it were not for the power tools that help them do a job faster and more efficiently. Power tools today are a

Foreman John Wright and helper Gene Conner, left, use power drive to pull feeders to other panels.

essential for efficiency and economy

must in an electrical contractor's setup.

Our $11,000 inventory of power tools and equipment for our mechanical staff of 40 includes jetline guns, hydraulic benders, power vises, hydraulic crimping tools, electric saws, electric hammers, hydraulic pumps, stud guns, wire pullers, power tools for cutting and threading pipe, rolling scaffolds, hydraulic knock-out cutters, and power drives.

Stockman maintains records

Our tools are hung and binned in our Manassas, Va., warehouse, with our stockman maintaining all tool records. Moreover, he is charged with maintenance and repair, catching any defects when he checks in a tool or before assigning it out.

A job foreman notifies the office when a particular power tool is wanted on a job, and the office fills out a requisition form. Indicating date, job on which the tool is wanted, name of tool, what its application will be, and time indications of length of time it will be used, this requisition is given to the warehouse stockman who places the tool on a truck and is personally responsible for its delivery.

Noting the hour the tool was put on a job, he charges a job in accordance with cost of tool and length of time it was retained on a job. A hydraulic bender that cost us $400 has a 24-hour rate of $2 a day. Rates by the day are computed on the basis of original tool cost.

The stockman does his charging of tools to jobs on the requisition form and this form goes to the bookkeeper who runs a ledger sheet on each job. Tool charges are posted to the job's ledger sheet from the requisition.

When a job foreman receives a power tool he has requisitioned, he signs the ticket presented to him by the stockman. He is now responsible for the care and safety of the tool, its proper handling and application, and its return to the warehouse. The mechanic using the tool does not sign for it. Familiar with the operation of the tool, the mechanic puts it to use and returns it to the job foreman when he is through with it.

We have a policy of promptly replacing a tool when it is broken or damaged beyond repair. Even if a mechanic breaks one of his own tools, we see that it is promptly replaced. For a serious loss of time and labor follows if a mechanic is handicapped without proper tools. This would show up in a marked reduction of profit.

Top mechanic tries tools

When we consider a new tool on the market, we have our top mechanic try it out. It will be taken to a job by the manufacturer's salesman and demonstrated. If our top mechanic tries it, finds it useful, and recommends its purchase, we have him instruct job foremen in its operation and application, and they in turn teach the mechanics. Safety precautions are incorporated into this instructional procedure.

Through the years we have had neither losses nor thefts in power tools. We compute tool depreciation on a five-year basis.

Size of a job determines whether

(Continued on page 107)

On electrical installation at a school, John Wright is cutting a hole in a box with a knock-out punch. Foremen are responsible for care of tools.

A 2½-inch conduit is being bent by this device, owned by J. C. Harman and Son. The company has an $11,000 inventory of power tools, equipment.

Dennie Electric Company can operate small power tools with a generator mounted under the hood of a truck. The $150 generator provides 2,500 watts of power, saves the company many hours each week.

Generator mounted under hood powers tools

By S. W. Ellis

This article should be especially helpful to the following readers:

Electrical Contractors ✓
Electric Utilities ✓
Electrical Wholesalers ✓
Electrical Inspectors
Industrial Engineers
Consulting Engineers

◆ IN THE FAST-GROWING industrial town of Jacksonville, Ark., the Dennie Electric Company is using a generator mounted in the hood of a truck to operate small power tools needed to expedite jobs created by the owner's house-power-for-electrical-living promotion.

J. E. Dennie has equipped the truck that he drives with a 110-volt generator fitted into the hood of the truck. Operating only when the motor is running, the $150 generator provides 2,500 watts for emergency electrical work.

Mr. Dennie states that the generator is one of the best time-saving devices he uses, for repairs and remodeling as well as for new wiring. When the house meter must be torn down, or before power is available in new construction, the generator proves its utility. Mr. Dennie uses it practically every day.

One of his most frequently used tools, the electric drill, would be of no use at times without the generator in the truck. Mr. Dennie declares that this one tool, operated from the truck, saves him many hours every week. He also operates his portable pipe threader, boring machine, and other small power tools from truck engine power, converted by the generator.

Active promoter

Mr. Dennie is one of the most active contractors in his area in the promotion of electrical living. He keeps closely in touch with new construction of homes, and sees the builder, the owner, and the architect to influence wiring for electrical living. Every day he takes time off from everything else to do what he terms "truck-snooping" to spot new construction.

Air conditioning and electrical space and radiant heating are his specialties for hard-hitting promotion. When he learns that a new room is to be added to a house, he is often successful in inducing the owner to install air conditioning or electrical heat.

Because he values his truck highly in his promotional program, he strives to have the most attractive trucks in his area.

According to Mr. Dennie, "Large contractors can afford to operate dingy, unattractive trucks, but not a small contractor like myself who is growing with the town. My truck gets some grooming every day to keep the blue paint dust-free and shiny. Even the spare tire on the truck I drive is kept spotless."

His name, on both sides of the trucks, is practically a billboard. The sign painter was instructed to make the truck signs easily read, in all kinds of weather.

Each side of the truck has a large sign reading, "Your local housepower contractor." Mr. Den-

(Continued on page 107)

How Code questions were answered at the Southern Section meeting

◆ ONE of the principal features each year of the annual meeting of the Southern Section, International Association of Electrical Inspectors, is the question and answer period which provides an opportunity for electrical contractors, consulting engineers, equipment manufacturers, and others, as well as electrical inspectors, to discuss the application of the National Electrical Code to specific electrical wiring problems.

A complete transcript of the meeting, held recently in Houston, will be published by the IAEI sometime in 1961. Following are answers to some of the more important questions discussed at the Houston meeting. These have been edited, in the interest of brevity and clarification, by the Southern Section secretary, A. M. Miller.

(1) Reference is made to a-c motors not of the wound rotor or sealed hermetic type, nor to those in package units.

Statement: A two-speed motor is used for air conditioning; each speed is supplied by magnetic controller equipped with thermal overload devices rated properly for the full load ratings of respective speeds. The motor is supplied by one branch circuit with branch circuit overcurrent protection permitting acceleration at the highest rating. The motor operates for indefinite periods of time at full load ratings of the respective speeds.

Question: Assuming the Code permits one branch circuit for the supply, how are the conductors between the controllers and the motor to be computed.

Question: How may all the provisions of Section 430-51 be complied with in respect to branch circuit overcurrent protection for the different sizes of conductors, thermal overload devices in controllers, etc?

Answer: The code does not specifically cover such installations at present. See 430-53 (b).

(2) Section 220-2 (second paragraph).

Question: Is it the intent that the grounded neutral conductors of multi-wire branch circuits be increased 25% also?

Answer: Yes.

(3) **Question:** What installation requirements are applicable to installations of type ACV cable on circuits in excess of 600 volts, as contemplated in Section 710-3?

Answer: Section 334-3. Second sentence.

(4) **Statement:** A dwelling contains rooms having two or more small usable wall spaces exceeding two feet, with doors or doorways intervening between each of the spaces.

Question: Is it the intent that receptacles must be installed in each of the small usable spaces, regardless of the proximity of receptacles that may be within six feet of such locations?

Answer: Yes. See Section 210-22(b).

(5) Table 220-5, note 5.

Question: Is it the intent of this section to prohibit one wall-mounted oven and one counter-mounted cooking unit on an individual branch circuit?

Answer: No, provided there is no reduction in conductor size except as permitted in Section 210-19 (d).

(6) Section 220-4(j). A multi-family occupancy will have 200 clothes dryers; 200 disposals; 200 dishwashers, and 200 other fixed appliances.

Question: Is it the intent of this section to limit the demand to 75%, including the clothes dryers?

Answer: The demands of 220-6 may be applied to the clothes dryers, and 75% to the other fixed appliances.

(7) **Question:** Is it contemplated that requirements on installation of non-metallic conduit will be included in Chapter 3?

Answer: No request has been made to this date.

(8) **Statement:** Table 1 allows as many as 208 No. 12 wires in a 5-inch conduit. Table 5 allows a 40% fill of the internal area of conduit or tubing. Paragraph 362-5 limits the number of conductors to 30 in a wireway and also limits the fill of wireways to 20% of internal cross sectional area.

Question: (A) Why are wirewavs limited to 30 conductors and 20% fill? (B) Why are you allowed more conductors and a greater fill in conduit and tubing than in wireways?

Answer: (A) There has been no record of bad performance and no de-rating is required. (B) Space prohibited more without resulting in excessive heating of conductors, therefore a number was selected that would not produce an undesirable effect.

(9) Section 210-6, exception 2.

Question: Does this section mean that these fixtures cannot be mounted less than eight feet from the floor if there are no integral switches involved?

Answer. Yes. See 110-15.

Question: Can a fixture of this type be installed more than eight feet above floors, if they contain an integral switch?

Answer: No.

Question: Can above fixtures be mounted at any height when containing integral switches?

Answer: No.

Question: Can these fixtures be mounted less than eight feet under any conditions?

Answer: No.

(10) Section 7321-(b) 1956 Code contained separation requirements of conductors in open spans.

Question: Where are these requirements found in the 1959 Code?

Answer: See Section 730-14(a) and 230-47 (Note taken by O. K. Coleman to include provisions of 1956 Code in the 1962 Code.)

(11) Section 430-86.

Question: Would a toggle switch controlling the coil circuit and mounted on a motor cat-head meet the requirements of this section?

Answer: Yes.

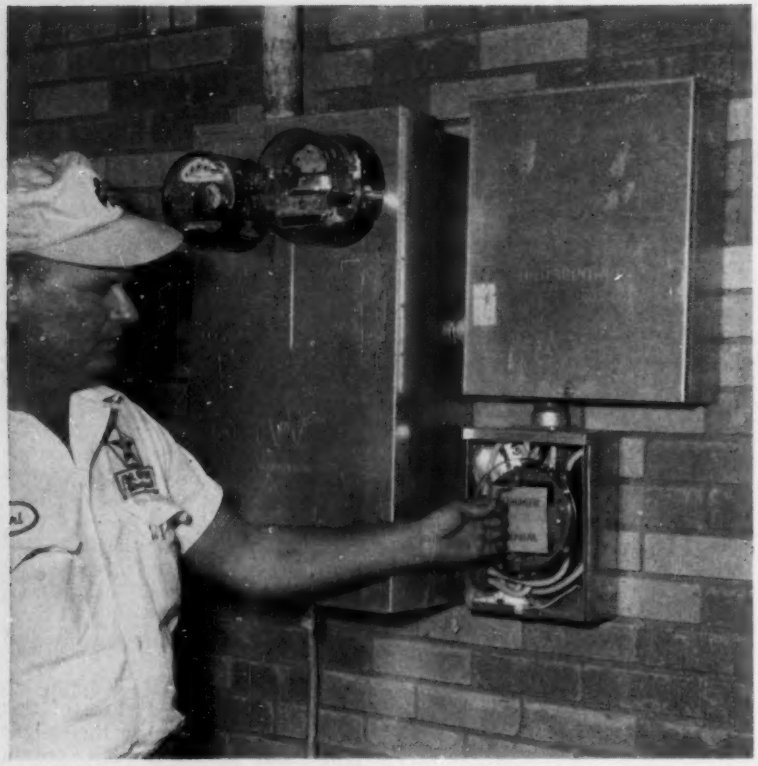
(12) Section 511-2(a & c).

Question: How would the area directly above, and within 18 inches of floor level, of a pit in a commercial garage be classified?

Answer: Class 1, Division 2. Section 511-2(a) applies to all floor levels and takes precedence over sub-paragraph (c).

(13) Sections 220-4(e) and 220-7. In computing the service and feeder conductors for a single

(Continued on page 106)



This change-over device permits switching electric space heating equipment to one cent water heating rate during the five winter months.

Utility promotes electric heat with special winter-time rate

By Ruel McDaniel

This article should be especially helpful to the following readers:

Electrical Contractors ✓
Electric Utilities ✓
Electrical Wholesalers ✓
Electrical Inspectors
Industrial Engineers
Consulting Engineers

◆ IN SOUTHWEST TEXAS, where Central Power & Light Company operates from headquarters at Corpus Christi, the heavy use of air-conditioning equipment provides ample domestic load for the company during more than half the year. When cool weather comes, however, and air conditioners are turned off, the load drops tremendously.

To counteract this load-loss during five months out of the year, the company has been pushing the use of electric water heaters for some time. As an inducement for users to switch to electric heaters, the company installs a special heater meter and charges for power used to operate the heater at only one cent per kilowatt hour.

This fall the company has taken another step to promote greater domestic use of electricity during the five cool months. It has launched a continuing promotion to sell home owners on the use of electricity for heating, and to make this especially attractive it has set up a one cent rate for electric heating equipment.

The company kicked off the promotion in the middle of July, and it encompassed every segment of the industry throughout the area. It is a continuing campaign, explains Advertising Director Maurice Gardner, and will be carried on indefinitely if results continue as effective as they have been so far.

The program includes not only an extremely low rate set up especially for consumers using electric heat in conjunction with electric water heaters, but something unique in the method of applying the low winter rate.

The heating rate is available only to consumers who have electric water heaters and 230-volt equipment, with the exception of persons building new homes who wish to have the 230-volt equipment installed at the time of the new-home wiring.

Special change-over box

When a consumer contracts for utilization of the special heating rate, the company installs a special change-over box in conjunction with the 230-volt service entrance. This change-over installation is so constructed that the switch-over to the winter rate is accomplished when the lid of the special box is removed, turned around, and reinserted. Top of the lid is marked "winter," the bottom "summer."

The new low rate for heaters goes into effect on October 15 and remains in effect until April 15.

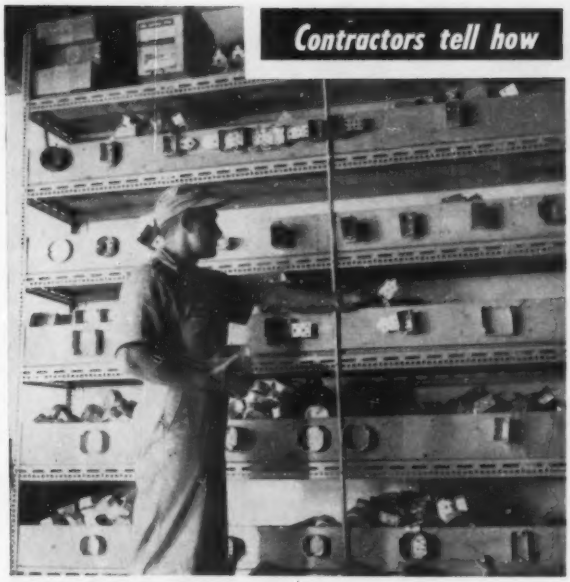
A company meter man makes the change-over, which means simply switching the remainder of the 230-volt wiring over to the water heater meter, which carries the one cent rate throughout the year. Thus any heater which carries 230-volts may be switched over to the water heater meter during these five months, but the appeal is made particularly to owners of heat pump units.

"If it becomes warm enough after October 15 or before April 15 for the heat pump owner to use his air-conditioning, he gets a rate break," Mr. Gardner explains, "because the heat pump is still connected through the water heater meter, even though the air-conditioning unit is operating. And of course we don't mind that. The purpose of the program is to increase our load during the five cool months, and if the weather becomes so warm that the home owner needs his air conditioner instead of heat, that is fine with us."

On April 15, a meter man will turn over the cover of the meter box and thereby switch the circuit from the water heater meter to the regular household meter, so

(Continued on page 107)

Contractors tell how



Since each bin is identified with a sample of the device or material contained, the selection of material for a given job is speeded up considerably.

Ridgeway Electric Company has found it advantageous to keep a three-week supply of regularly used items on hand at all times. Delays are thus avoided.

Smooth flow of materials boosts job progress and profits

By Benjamin D. Jones
Manager
Ridgeway Electric Co.
Catonsville, Md.

◆ MOST IMPORTANT to labor time savings on a job and its profitable outcome is having necessary materials on hand when a job is to be started and during its progress. Lost time can be very costly when men lack materials that are neither in the shop nor immediately available from a local supplier. To avoid this situation, we carry a good stock of diversified materials at all times. This permits us to figure jobs more closely and more efficiently.

On a large job we order materials at least 30 days in advance of time the materials will be needed. On a large job where list of materials and price breakdown are known, orders have been placed with our manufacturer and supplier six months in advance. In a materials market that fluctuates fast, a long standing order often protects a contractor pricewise. This can mean the difference between a profit or loss on a job.

Some materials are ordered sent right to a job and some stocked in the warehouse till a job is ready for them. Materials going to a job directly are generally used within a few days or a week.

We stock in our warehouse enough of regularly needed staple items for a three-week period, and odd items only for special customers.

In order to take advantage of price we may buy a four-month supply of wire. Knowing prices were going up, we recently shopped around on wire, checking New York prices against Baltimore prices (we are located in Baltimore County). We bought a seven-month supply of 14/2 wire at a good price saving about $3,000.

Preplanning business by buying six months ahead of time will put a contractor in a favorable position. Deliveries can be spread out according to needs.

To assure our jobs a smooth materials flow we have our job superintendents call in daily at noon for the following day's needs. Any changes on a job are related daily. Materials deliveries from our warehouse to jobs takes place weekly. A trailer with a workshop is maintained on each large job.

Power tools up contractor's profits

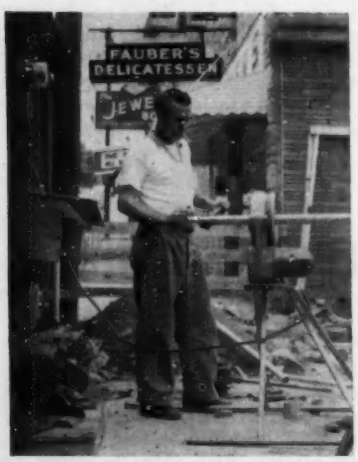
By Leo H. Lafferty
Charles Lafferty and Sons
Waynesboro, Va.

◆ TIME SAVING power tools can prove a significant saving factor in the profitable handling of a job. Take the electric vise for threading conduit, for example. It cuts, threads and reams 2-inch pipe in five minutes, a job that formerly took 30 minutes. Costing only $300, an electric vise actually saves us one man on a $10,000 job, which amounts to a payroll cost reduction of about $1,200.

The hydraulic conduit bender shown here eliminates one whole operation on certain electrical jobs.

Another tool that has proved a worthwhile time-saver is the hydraulic conduit bender. This tool forms angles and makes bends that would be impractical to buy, yet are essential and have to be specially made. While the tool costs $235, savings are inestimable. It saves us time ordering and waiting for such material, and is a money saver because we do not have to cut pipe in small lengths to insert various angles. This is a tool that I would not want to be without.

As portable items readily moved from one job to another, these tools are ruggedly built and stand up under hard wear. They are well worth their investment.



This electric vice, used for threading conduit, can mean one less worker on a $10,000 electrical job.

Metal rack displays job information easily

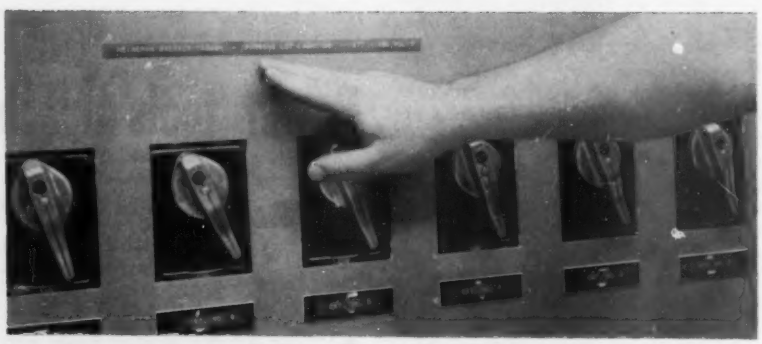
This rack is a workhorse at Boggs Electric Co., Oklahoma City, Okla. Owner C. W. Boggs, shown here, had a tin shop build this rack with 12 slots across, and 12 down. Information on jobs in action or jobs ready to be worked is placed in slots under truck numbers of the crews doing the work. All tickets are visible at a glance, and there is no thumbing through or searching for information.

Embossing tapes for switch labeling

By David C. Smith
B and D Electric Company
Mt. Rainier, Md.

◆ WE HAVE found that embossing tapes and sticking them on panels to identify services is a neater, cleaner, quicker, and more attractive job than other types of labeling, and is both time and labor-saving. Equipment to do this consists of a manually-operated embossing machine, spool, and fibre tape in lengths of several feet. Little effort or skill is required to

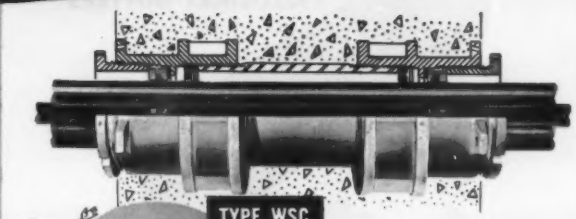
(Continued on page 106)



Embossed tapes, used to identify the above panels, have been found to be less expensive and more effective than other labeling methods.

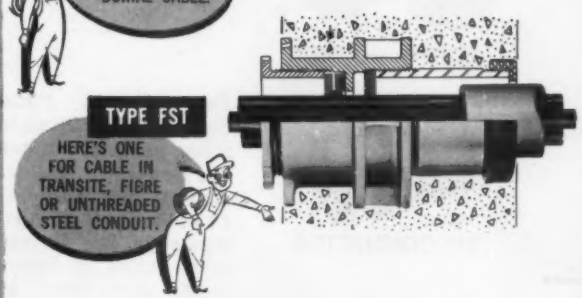
NEW! a complete line of O.Z. WATERTIGHT ENTRANCE FITTINGS

for Conduit or Cable



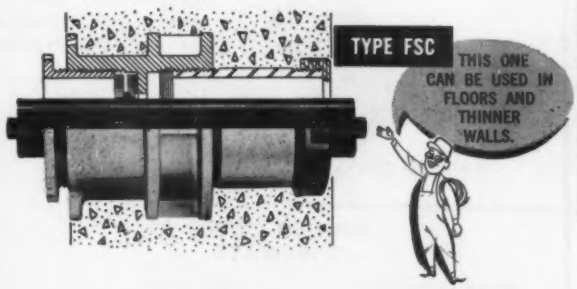
TYPE WSC

HERE'S A SEAL FOR DIRECT BURIAL CABLE.



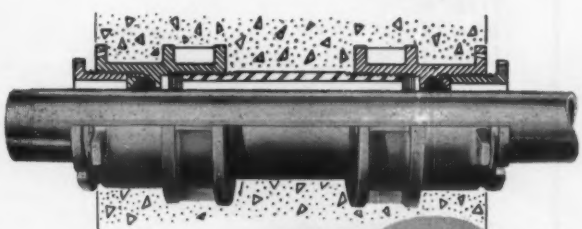
TYPE FST

HERE'S ONE FOR CABLE IN TRANSITE, FIBRE OR UNTHREADED STEEL CONDUIT.



TYPE FSC

THIS ONE CAN BE USED IN FLOORS AND THINNER WALLS.



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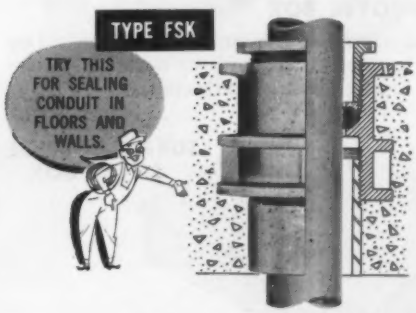

TYPE FSK

TRY THIS FOR SEALING CONDUIT IN FLOORS AND WALLS.

For more information on fittings and other O.Z. products, call your local distributor, or write to the company.

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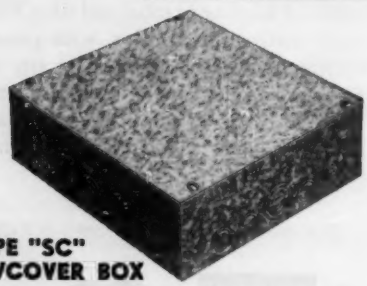

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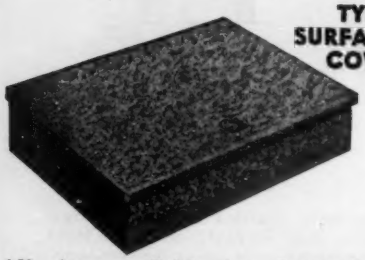

All sizes available for electrical cutouts, switches, relays, junction and pull box applications, galvanized or grey—with or without knockouts.

WIREWAYS and DUCT

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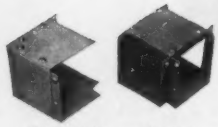

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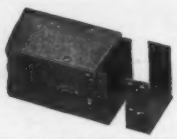
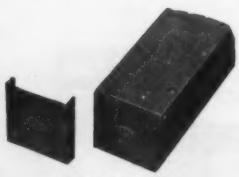


"U" CONNECTOR



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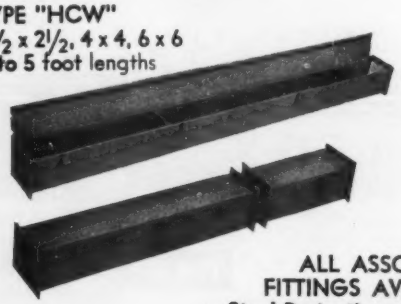
1 to 5 foot lengths



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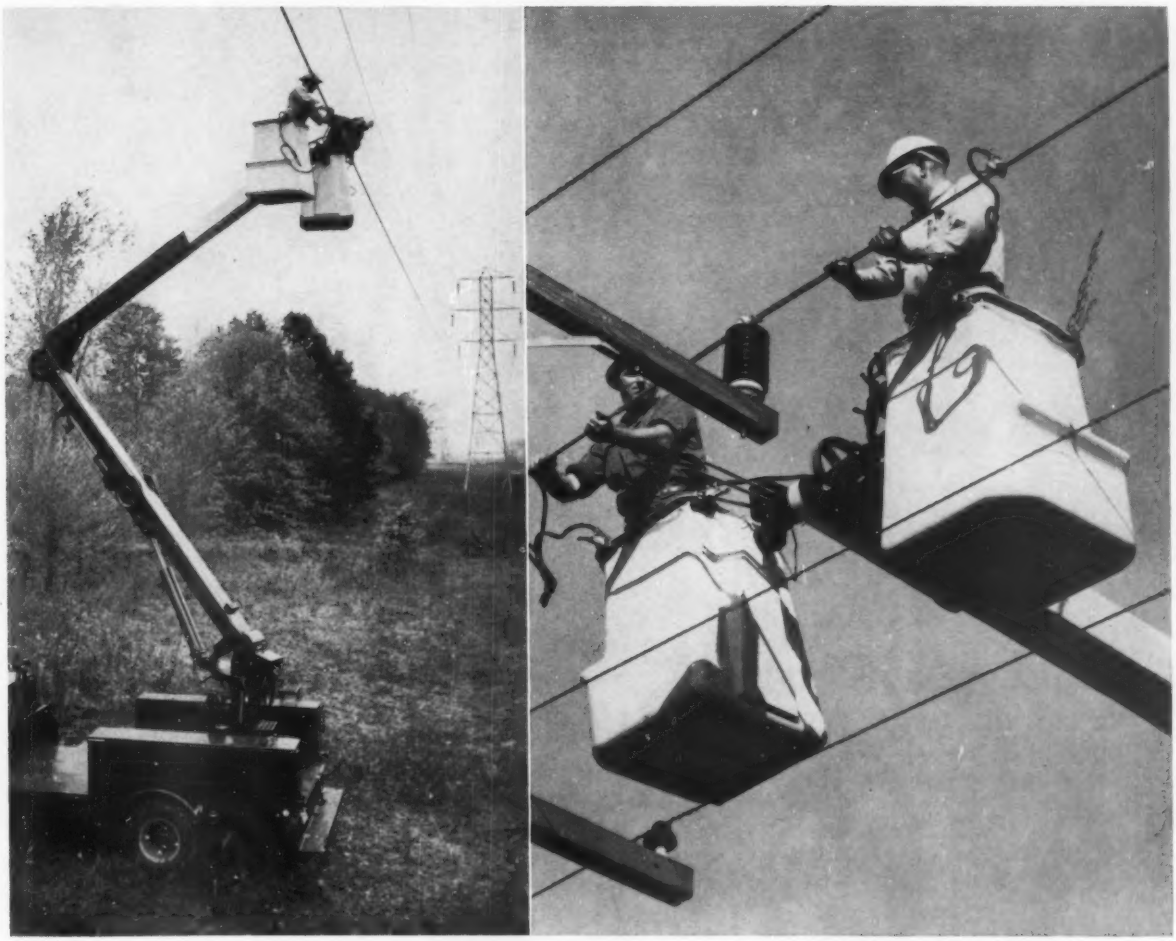
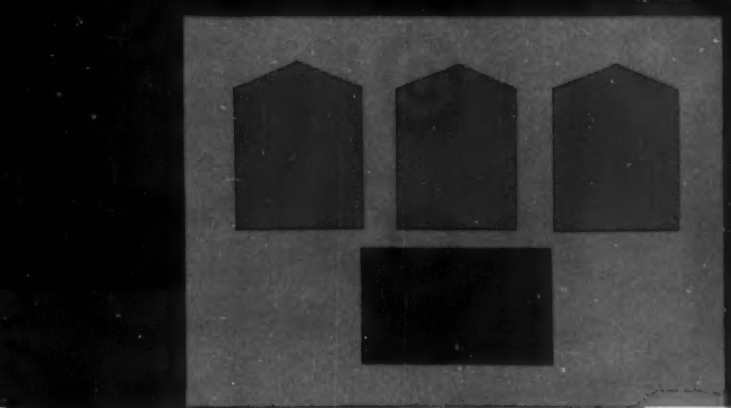


New technique permits bare hand working of high voltage lines—see page 68

Review of banked secondary experience—page 64
Dual-range demand register converts watthour meter—page 67
Multi-step process transforms pine to pole—page 70
Comment on modern meter construction—page 72
Recommendations for reuse of poles—page 73
Groundline treatment data on standing poles—page 74

Why Electro-Motive peaking



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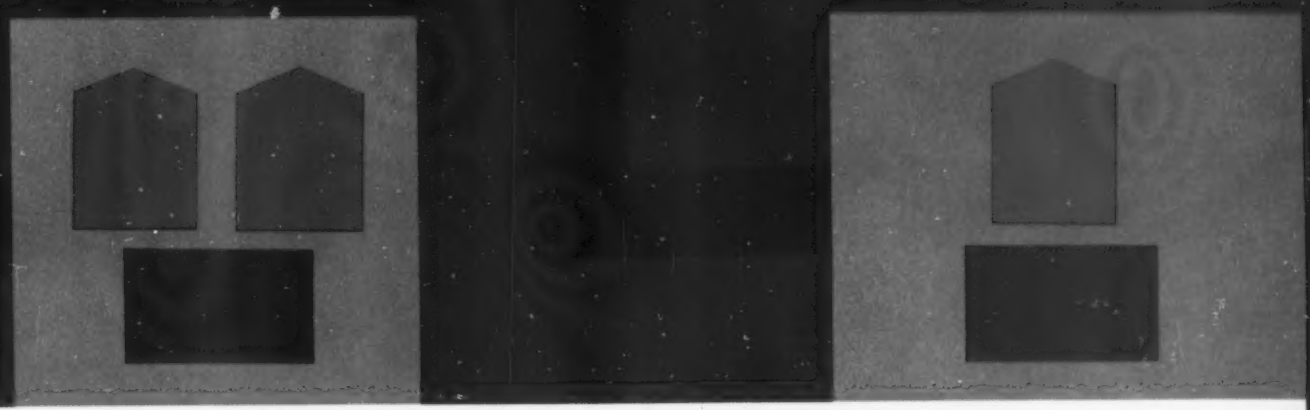


the peaking power at the point of load

power . . . practically eliminate preparation-for-peak expenses.

AREA PROTECTION—You gain automatic, unattended area protection in case of line outage.

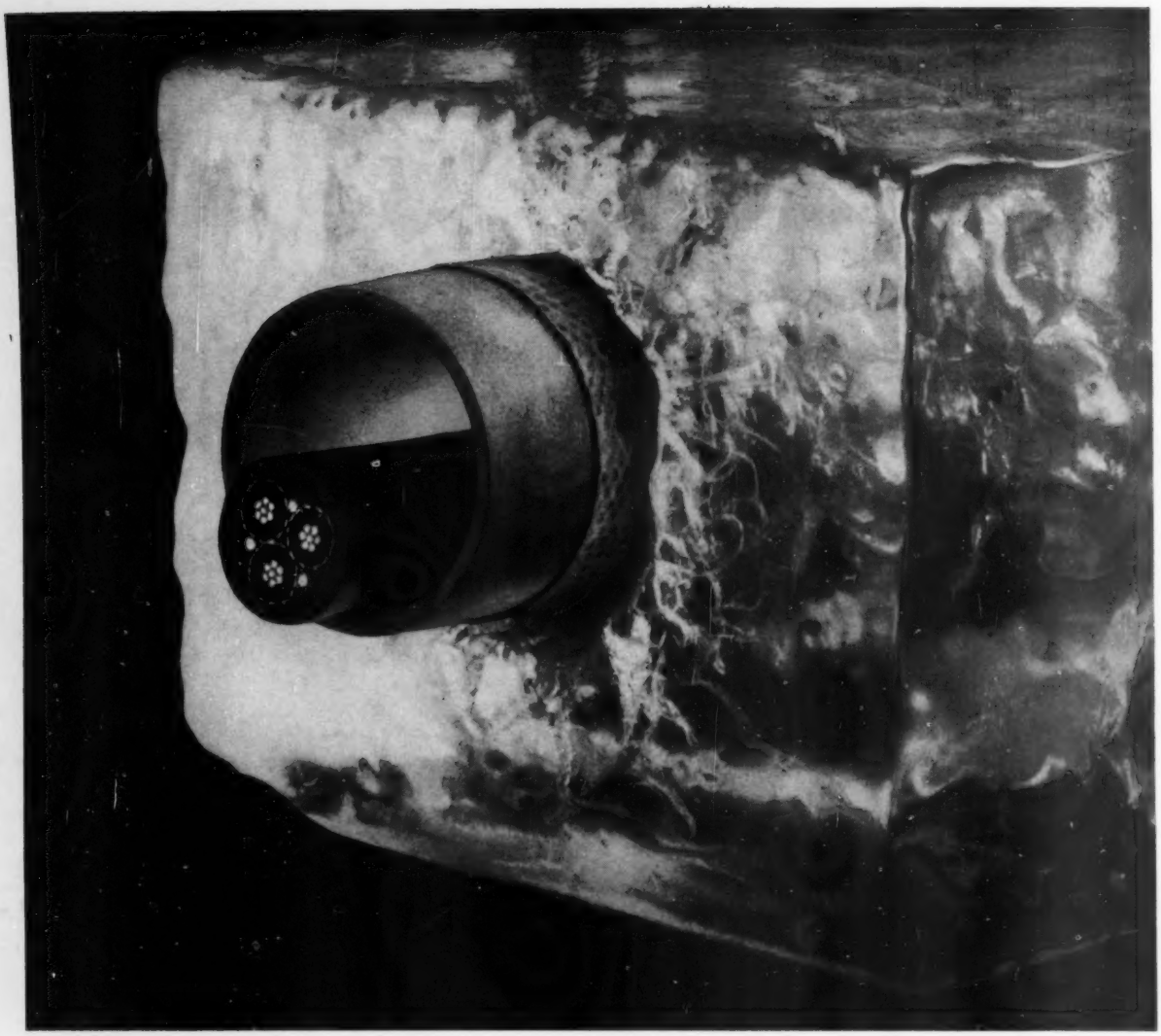
INDEPENDENT MAINTENANCE—Your peaking and area protection generation is not affected by central station maintenance.

STANDARDIZED EQUIPMENT—You get standardized Electro-Motive equipment, completely self-housed, portable and conveniently sized to fit any location.

The logic of decentralized Electro-Motive Peaking Plants can be the answer, if you are looking for the next step in system efficiency. Electro-Motive power can mean substantial savings in many areas of your system operation. For a complete description of all the advantages of decentralized Electro-Motive Peaking Plants, contact your Electro-Motive representative.

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS
LA GRANGE, ILLINOIS

Offices: Chicago, New York, St. Louis, San Francisco • **In Canada:** General Motors Diesel Limited, London, Ontario

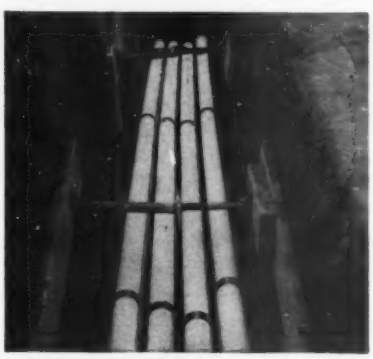


Cooler cables at lowest costs with Transite Ducts!

Do you know that electrical system losses amount to more than four hundred million dollars annually? Research shows that these losses can be drastically reduced by improving the dissipation of heat from conductors under load. The most efficient and economical way to accomplish this is with inorganic Transite® Ducts.

Tests prove that asbestos-cement Transite Ducts can actually have as much as 110.6% greater heat-carrying ability than organic ducts. This means that when a conductor is supplying a given load, its temperature will be substantially lower in Transite. These cooler cables result in lower electrical resistance with correspondingly lower I^2R losses. At a $20/KW cost, this can save you as much as $8.20 per thousand feet a year. Lower operating temperatures mean longer cable life and more reliable service, too!

Because of their 10′ lengths and speedy coupling method, Transite Ducts can be installed at the lowest cost. Get the full story by writing Johns-Manville, Box 14, ES-12, New York 16, N. Y. In Canada: Port Credit, Ontario.



JOHNS-MANVILLE

JM

Type 2-A

NEW!

ENGINEERED INTO BLACKBURN ALL-ALUMINUM 2-BOLT CLAMPS...

ALL WEATHER PROTECTION

On Aluminum or Bi-Metallic Connections

Contact surfaces guarded by rainshield design of castings—inhibitor will not "wash out" even under driving wind and rain.

Condensation is drained off through ports in castings regardless of installation position—never allowed to accumulate around the conductors.

Designed with hot stick crews in mind.

Massive all-aluminum clamp—including hardware—may be used on aluminum or on copper conductors with inhibiting compound. Extra thick, highly conductive aluminum spacer separates dissimilar conductors for added corrosion protection.

Four clamps accommodate a wide range of wire sizes—main from 6 to 795 ACSR, tap from 8 to 397.5 ACSR. Write for samples and literature.

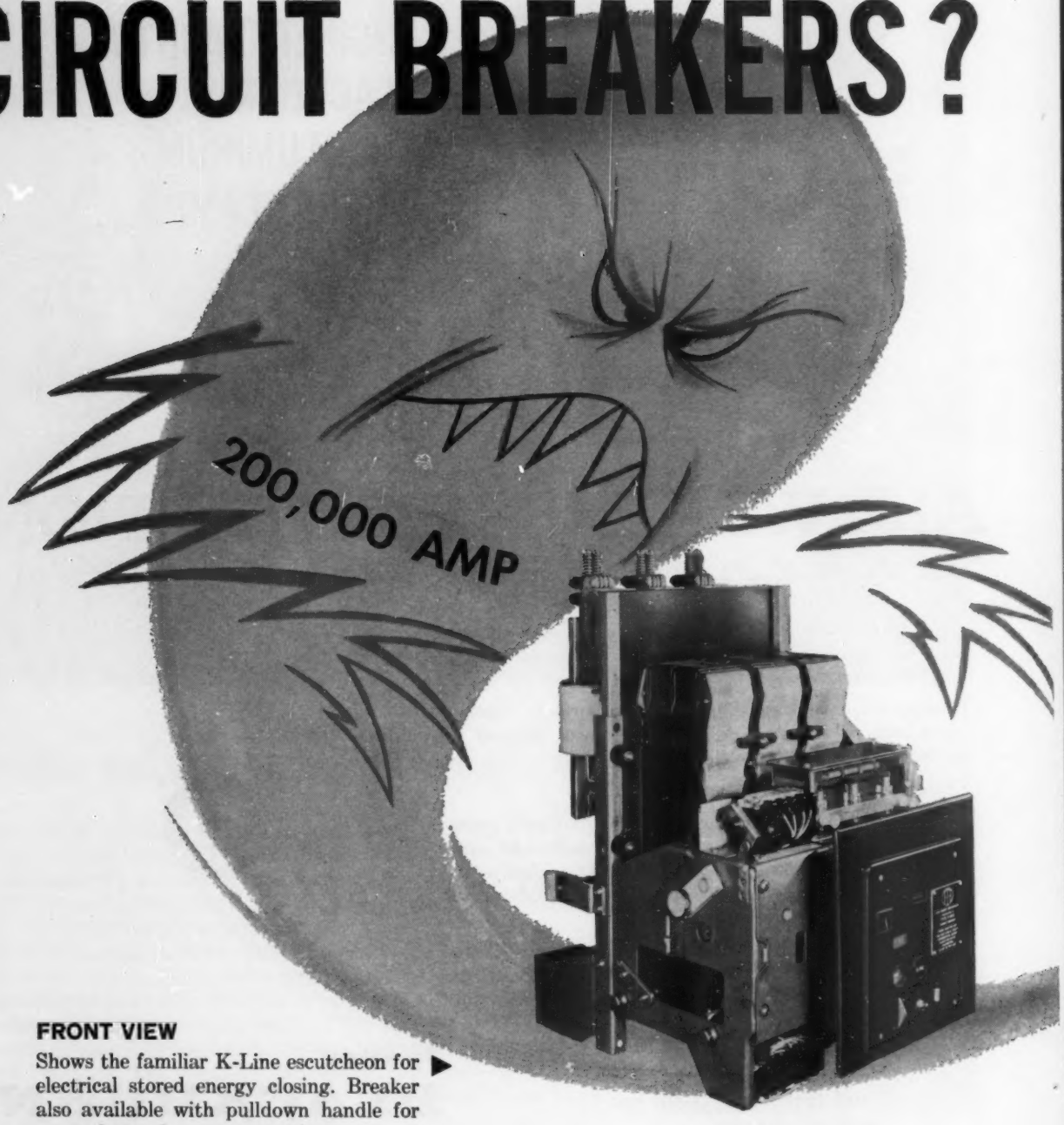
LIVE BETTER ELECTRICALLY

For complete information and test data: Send for Bulletin #6003

Jasper BLACKBURN Corporation

1525 Woodson Road • St. Louis 14, Mo.

HOW MANY AMPERES LURK BEHIND YOUR LOW VOLTAGE CIRCUIT BREAKERS?



FRONT VIEW

Shows the familiar K-Line escutcheon for ▶ electrical stored energy closing. Breaker also available with pulldown handle for manual stored energy operation.

I-T-E's new K-Don protects against fault currents up to 200,000 amp—plus giving you the complete range of K-Line circuit breaker operation

Suppose you have a low current fault. The K-Don circuit breaker element gives you time delay tripping. Or a medium current fault. You get instantaneous tripping. And for really high-capacity faults, you have the current-limiting action of Amp-trap® fuses in series with the breaker.

MAXIMUM FUSE ECONOMY

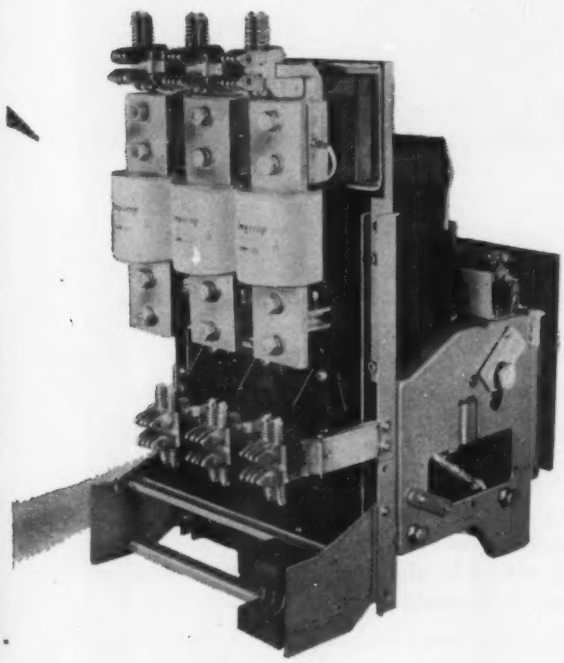
Only the I-T-E K-Don gives such complete protection—circuit breaker protection over the standard circuit breaker range and economical fuse protection from there on up to 200,000 amp. The only time fuses blow is when fault current is too high for the circuit breaker to handle. The K-Don is not a fuse hog.

NO SINGLE PHASING

The K-Don gives you this double protection all in a single compartment—saving you cost and bulk. And regardless of the type of fault, all three phases open every time. No single phasing to cause costly equipment damage.

COMPLETE RANGE OF RATINGS

Basically, the K-Don is a standard 600 volt K-Line circuit breaker with current-limiting fuses in series. Besides high current protection, you also get the advantages of expanded range trip and closed door drawout. Breaker ratings range from 30 to 1600 amp continuous, up to 75,000 amp interrupting. Versatility of protection is assured by a range of fuse ratings from 400 to 3000 amp. Drawout mountings are available in either Urelite® enclosures or switchgear assemblies. Write for detailed bulletin 4300-1A. I-T-E Circuit Breaker Company, 1900 Hamilton St., Philadelphia 30, Pa.



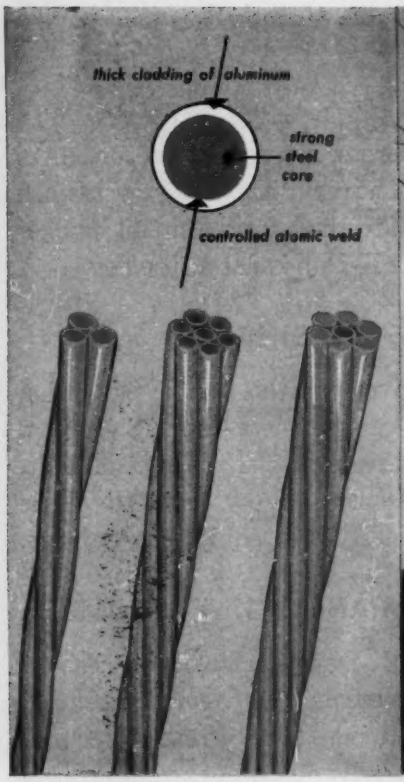
BACK VIEW

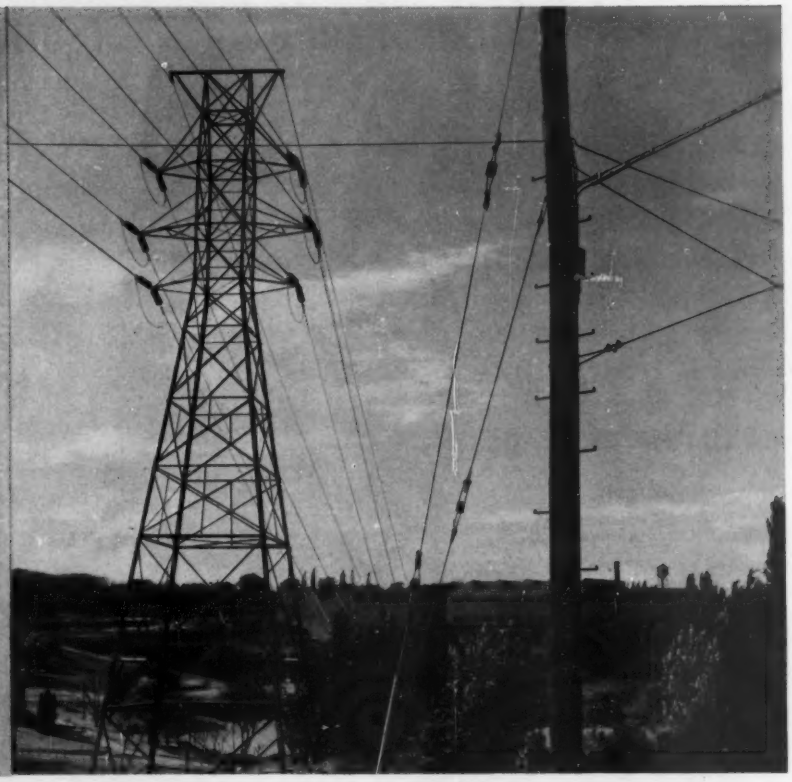
◀ Shows Amp-trap current-limiting fuses in series with circuit breaker. Fuses are on line side so they protect the breaker as well as connected equipment.

I-T-E CIRCUIT BREAKER COMPANY

The *Alumoweld technique* of welding aluminum to steel

means TOP PERFORMANCE... LONG LIFE... LOW COST





• You cut costs and assure top performance of your overhead lines when you use Alumoweld for overhead ground wire, guys, messengers, and ACSR core wire • You'll have no maintenance worries because a thick cladding of pure aluminum permanently protects Alumoweld's high-strength steel core from corrosion. In fact, Alumoweld has the same corrosion resistance as solid aluminum wire—and 33% of the electrical conductivity. Compared to steel, Alumoweld has three times the conductivity . . . is 18% lighter . . . just as strong . . . and will last far longer.

For overhead ground wire, Alumoweld is tops. The high strength-to-weight ratio permits stringing with smaller sags, thus increasing the mid-span clearance. Its excellent conductivity quickly discharges transient currents to ground—reduces service interruptions.

For guys and messengers, Alumoweld gives long, trouble-free life because it cannot rust. And it's strong and easy to install.

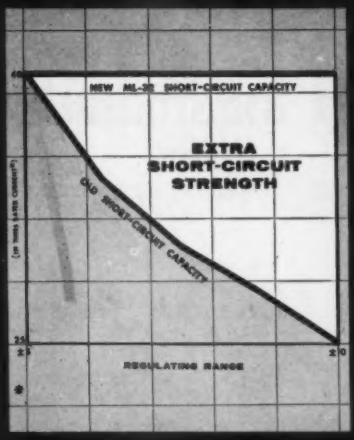
For core wire in ACSR Conductors, Alumoweld eliminates the danger of electrolytic action because it is compatible with solid aluminum wires. It coordinates the life of the strength members with that of the conductor members.

Get all the facts on this low-cost wire and strand by writing today for bulletin E.D. 3000.

ALUMOWELD

COPPERWELD STEEL COMPANY

SEVEN STEPS AHEAD IN VOLTAGE REGULATION



1 Increased short-circuit strength for longer regulator life

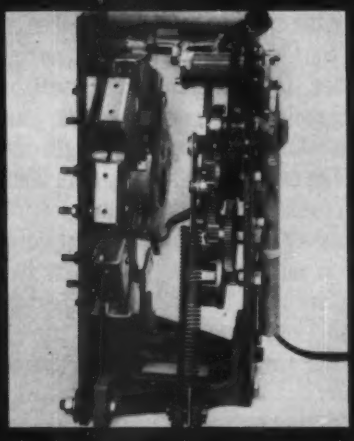
2 New Melalast cover finish increases protection against outages

3 New positive neutral indication protects linemen and equipment

4 Computer studies prove reduced bandwidths increase system earnings

5 Cyanoethylated coil insulation boosts reliability, lengthens life

6 New counter proves no increased operation at reduced bandwidth



7 Controlled switching speed maximizes contact life

1960 innovations emphasize General Electric leadership in voltage regulation

Watch for more to come in '61. Meanwhile, ask your G-E sales engineer for complete information about the full line of General Electric voltage regulators. Or, write General Electric Company, Section 456-6, Schenectady 5, N. Y. *Voltage Regulator Product Section, Pittsfield, Mass.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

LET'S TALK FUSE LINKS

■ Outwardly most fuse links look very much alike . . . but there the similarity ends! What, then, makes Kearney Fuse Links more dependable . . . more accurate than others? ■ Let's start with construction. All Kearney Fuse Links feature LOW temperature fusible elements and de-ionizing fibre lined tubes. Temperatures inside fuse tube and cutout cartridge always remain well below the fibre charring point . . . even after prolonged service overloads. Thus, the all-important fibre is not impaired by excessive heat . . . fuse tube and cartridge retain their original strength and arc-quenching capabilities necessary for positive full-range fault interruption ■ The exclusive de-ionizing fibre lining and extra strength of the Kearney fuse tube, in effect, make the Kearney Fuse Link a cutout within a cutout when interrupting fault currents up to 600 amperes.* Extra-long, tough, moisture and weather resistant tube provides a longer de-ionization path to clear low faults faster, more positively . . . will not warp or hang up in cartridge. Fuse tube and top terminal are securely joined to prevent loss of expulsion gas pressure ■ Select components, rigid quality control, exhaustive laboratory and substation testing guarantee strict adherence of Kearney Fuse Links to published T-C curves. For positive system protection and accurate co-ordination . . . specify Kearney Fuse Links . . . Standard or Specialized.

*An average figure varying with different fuse ratings.

KEARNEY

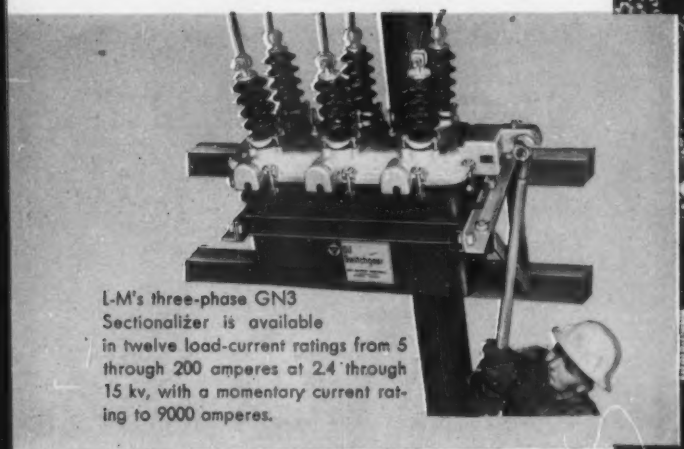
for better construction . . . safer maintenance . . . specify KEARNEY products

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

PLANTS AT: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH, IOWA • CLARINDA, IOWA • GUELPH, ONTARIO, CANADA • ST. THERESE, QUEBEC, CANADA

Puget Power Installs GN3 Sectionalizers For Automatic Protection Of 12.5 kv Line



L-M's three-phase GN3 Sectionalizer is available in twelve load-current ratings from 5 through 200 amperes at 2.4 through 15 kv, with a momentary current rating to 9000 amperes.

Puget Sound Power & Light Company has simplified coordination of its 12.5 kv distribution lines by utilizing L-M's new 3-phase GN3 Sectionalizers. Now when permanent faults occur, they can be isolated and maximum service continuity will be maintained.

In some cases, in order to utilize the counting feature of the GN3, oil circuit breakers were replaced with faster operating L-M reclosers. Faulted lines are isolated by this GN3 sectionalizer after three operations of the back-up recloser or station breaker.

L-M's 3-phase GN3 is a self-contained heavy-duty sectionalizer. The GN3 operates only when the back-up recloser is open; therefore it interrupts no current. It may be set to lock out after one, two, or three operations of the back-up recloser.

GN3 Sectionalizers have simplified the coordination of Puget Sound Power & Light Company's 12.5 kv distribution line. With the GN3 permanent faults are isolated and maximum service continuity is maintained.

Get Complete Information

Contact your L-M Field Engineer and learn how simply the GN3 can be installed on your line; or write for Bulletin CR6. Line Material Industries, Milwaukee 1, Wisconsin. In Canada: CLM Industries, McGraw-Edison (Canada) Limited, Toronto 13, Canada.

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

482

Reclosers, Sectionalizers, and Oil Switches

McGRAW EDISON

DISTRIBUTION TRANSFORMERS · RECLOSERS, SECTIONALIZERS AND OIL SWITCHES
FUSE CUTOUTS AND FUSE LINKS · LIGHTNING ARRESTERS · POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS · CAPACITORS · REGULATORS · OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS · PORCELAIN INSULATORS · FIBRE PIPE AND CONDUIT

Line Material Industries
Milwaukee 1, Wisconsin

ES-120

☐ Please send me Bulletin CR6 on the GN3 Sectionalizer.
☐ Please have L-M Field Engineer contact me.

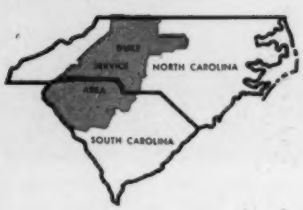
Name_____

Title_____

Company_____

Address_____

City & Zone_____ State_____



Thousands of F-P Controlled Lights Keep Duke Power's Area Bright as Carolina in the Morning

Nothing could be finer for back yards, barnyards, and business property — than adequate, automatically controlled lighting. That's the reason why increasing numbers of Carolinians are taking advantage of Duke Power Company's low-cost unmetered lighting service.

Fisher-Pierce Series 6600A Controls operate thousands of incandescent and mercury vapor lighting units that are provided for a flat charge of $3.00 per month — a rate made possible by connecting the lamps into existing 120-volt lines. Installation, power and maintenance are also included in this rate, but the use of reliable F-P controls helps to reduce maintenance to little more than replacement of burned out lamps.

Photoelectrically controlled all-night lighting is an excellent off-peak load builder for the utility. And for their customers, all-night lighting gives them economical protection from burglary and vandalism — as well as the reassurance of coming home at night to well-lighted surroundings. Regardless of season, time of day or the weather, Fisher-Pierce controls dependably turn lights on whenever they are needed.

AS SURELY AS DARKNESS FALLS, the lights will turn on. Fisher-Pierce tubeless photoelectric controls provide dependable, completely automatic operation of lights for streets, homes, farms, and business property.

MORE THAN ONE MILLION KW will be the capacity of Duke Power Company's Allen Plant. Already completed are four of the five units in what will eventually be the largest steam-electric power generating station in the South Atlantic states.

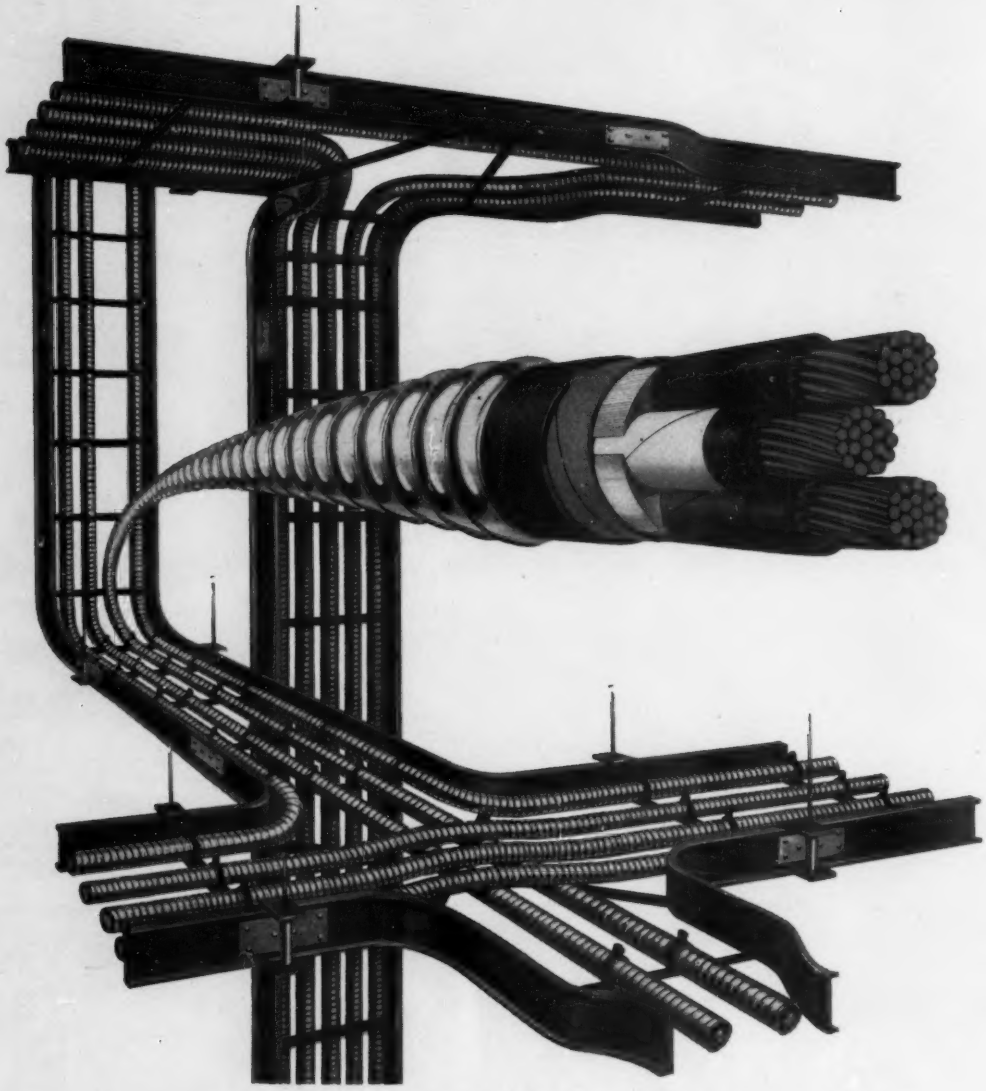
TOWARD NUCLEAR POWER — Duke Power Co. and three other major electric companies serving the Carolinas and Virginia have joined in planning and construction of a 17,500 KW nuclear power plant, scheduled for operation in 1962.

For complete design information and operating specifications on Series 6600A controls, write The Fisher-Pierce Co., 59 Pearl Street, So. Braintree 85, Massachusetts.

FISHER PIERCE

Electrical and Electronic Equipment for Industry, Utilities and the Home

AN AFFILIATE OF SIGMA INSTRUMENTS, INC.



PHELPS DODGE ARMO-LOK CABLE (TYPE ACV)

The First To Be Listed by Underwriters'

Phelps Dodge Armo-Lok (Type ACV) is the first varnished cloth insulated, PVC belted, galvanized armored cable rated up to and including 5,000 volts to be listed by the Underwriters' Laboratories, Inc. This cable offers a most efficient method of power distribution for industrial plants and utilities.

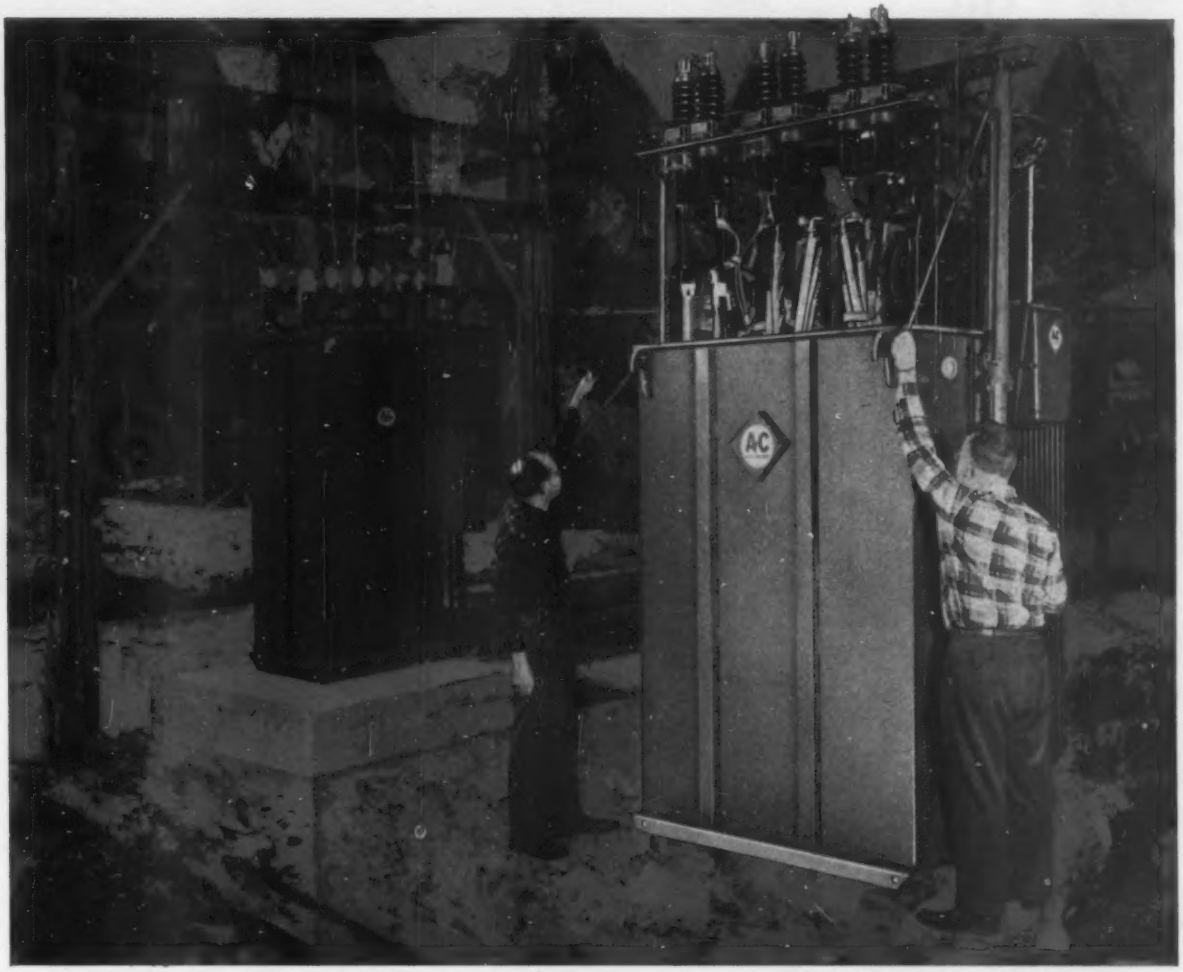
See your Phelps Dodge distributor for information about complete Armo-Lok Cable systems. Or write to Phelps Dodge, 300 Park Avenue, New York 22, New York.

PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 Park Avenue, New York 22, N.Y.

SALES OFFICES: Atlanta, Birmingham, Ala., Cambridge, Mass., Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Denver, Detroit, Fort Wayne, Greensboro, N.C., Houston, Indianapolis, Jacksonville, Kansas City, Mo., Los Angeles, Memphis, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Ore., Richmond, Rochester, N.Y., San Francisco, St. Louis, Seattle, Tampa, Washington, D.C.

ALLIS-CHALMERS

ORIGINATORS OF 5/8% STEP REGULATORS



SFR Feeder Voltage Regulator

Only exclusive unit construction delivers

extra regulator values you can see

Why is unit construction so important to regulator users? Simply because this design is *basic* to these many other extra-value A-C features *you can see*...advantages you can't find on any ordinary regulator!

You'll see continuous leads passing directly from the coils to the double-bolt terminals on the dial switch.

You'll see 78 fewer bolted connections only unit construction can offer. No leads to disconnect, no terminals to remove when you untank.

You'll see better workmanship, since all connections are securely made and double-checked *before* unit is tanked!

You'll see how much easier inspections can be. To untank, remove cover bolts and control compartment retaining nuts. Then lift entire assembly from the tank... there's no need to remove oil.

Your nearby A-C office has the facts on single and three-phase sizes from 2,400 to 69,000 volts... in ratings up to 2,500 kva. Or write **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin.

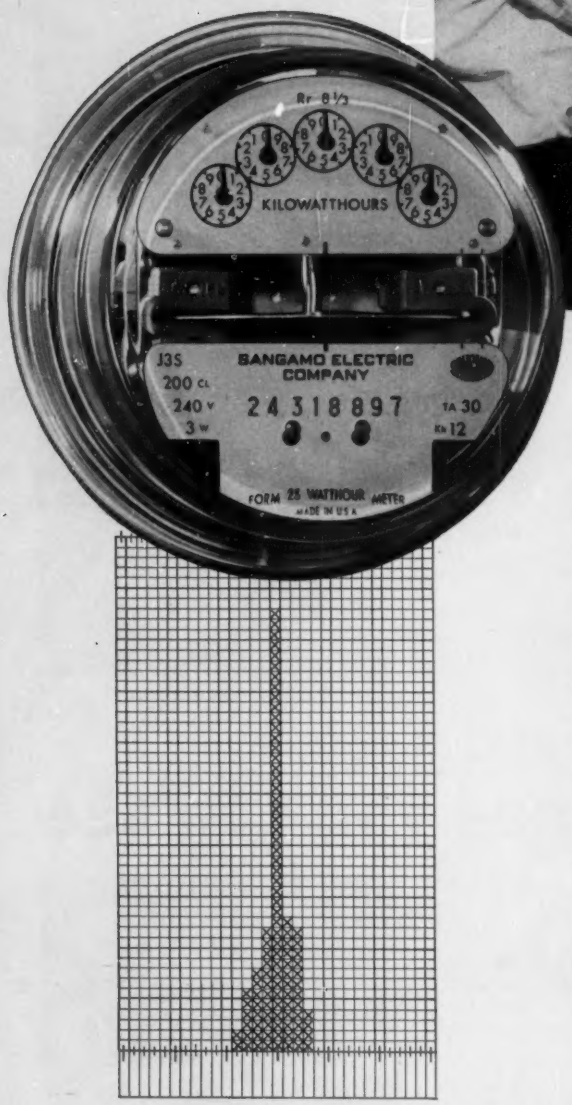
A-1379

Caliband is an Allis-Chalmers trademark.

CALIBAND control — At the twist of the control knob, you can set or test voltage level and band width without changing voltage or interrupting regulated service.

true MAGNETIC flotation

J3 THE METER BUILT FOR SAMPLE TESTING



Utility meter departments employing sample acceptance and service tests can depend upon the good $\bar{x}$ and σ results of Sangamo's new J3 to assist in reducing operating costs.

tremendous teammates

Sangamo J3 meters and sample testing are tremendous teammates. The J3 was designed with sample testing in mind... Its original accuracy and dependability will remain constant for many, many years. This goal was achieved by combining J3 True Magnetic Flotation with highest torque, slowest speed, high surge resistance, and a balanced moving system to give calibration stability.

Successful acceptance and service sample testing programs require the high sustained accuracy and long term service dependability inherent in Sangamo's new J3 meter.

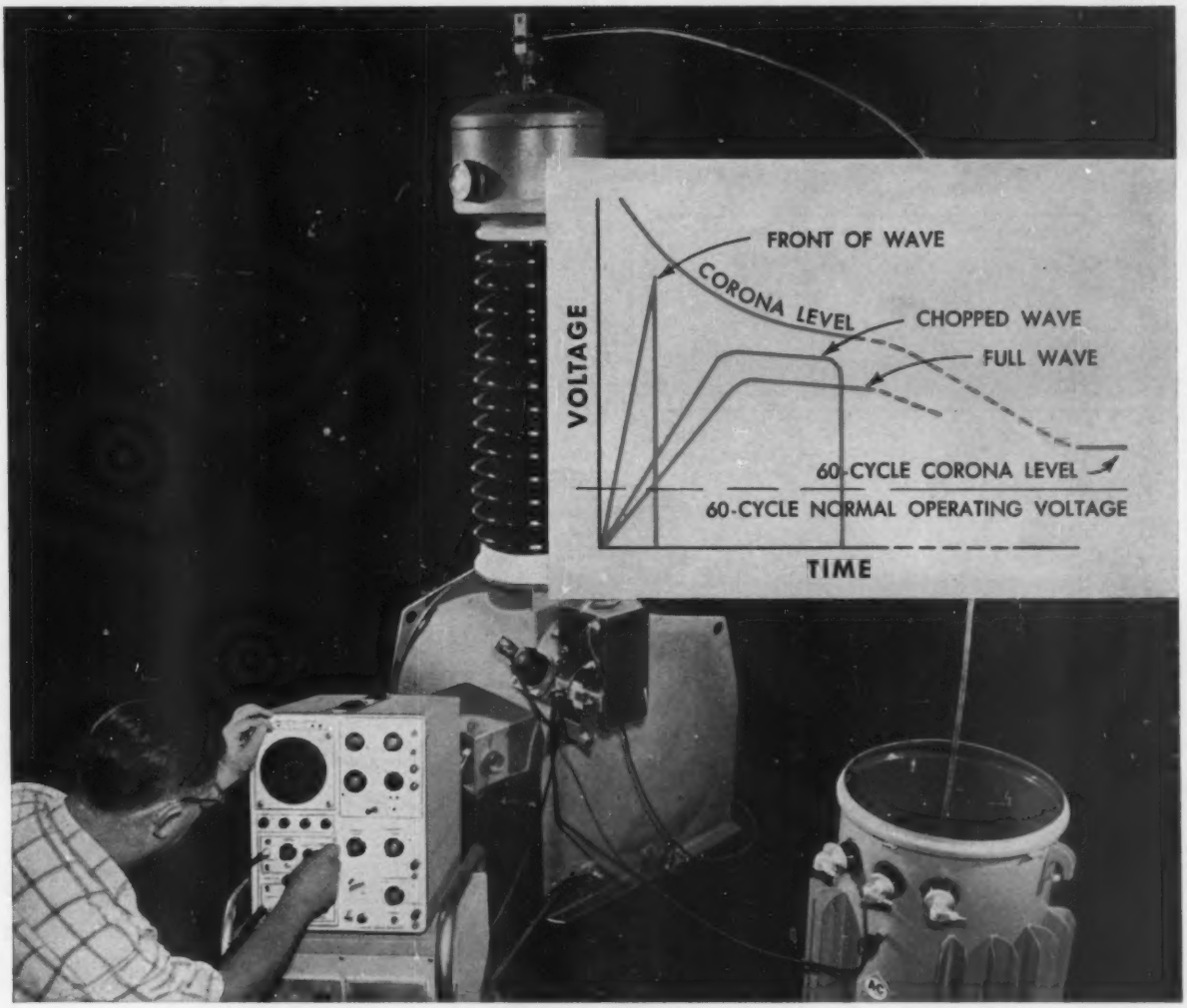
SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

JM60-10

ALLIS-CHALMERS

A-1391



Proven corona-free design lengthens transformer life

Allis-Chalmers transformer insulation (both winding and barrier) is designed (and proven by tests) to be *entirely free of corona*... not only at the operating voltage, but at *all test levels*. By use of superior measuring techniques and instrumentation, Allis-Chalmers engineers have established design criteria which bring this benefit to all A-C transformers from 5 kva through power transformers in the ASA standard range. Corona — the cancer of electrical equipment — is eliminated. The problems of carbonization of insulations and thermal breakdown of oil are substantially reduced.

Extensive studies on "compatibility" of insulations have also helped to increase transformer life. Through accelerated tests on many laboratory models and long-time tests on completed transformers Allis-Chalmers engineers have determined the ideal material combinations. Controlled processing to eliminate air and moisture lowers moisture content to as low as twenty parts per million.

Because of these three major factors . . . all A-C transformers in the above ratings built since January 1, 1960, are capable of delivering a twelve-percent increase in capacity at 65 C rise without loss of life.

• • •

For more information *about the additional built-in capacity of Allis-Chalmers transformers call your nearby A-C representative. Or write, Power Equipment Division,* **Allis-Chalmers,** *Milwaukee 1, Wisconsin.*

Get more usable Kva for your distribution transformer dollar with WAGNER®

HI-THERMAL-CAP *TRANSFORMERS*

Every dollar you invest in Wagner® HI-THERMAL-CAP Transformers really buys a dollar and twelve cents worth of usable Kva. For you can safely uprate these High Capability Transformers to 112% of their nameplate Kva without shortening normal life expectancy . . . without exceeding the allowable 65°C hot spot temperature rise.

HI-THERMAL-CAP Transformers have new, compact coils wound LV–HV–LV on one insulating cylinder. Corrugated oil ducts and thermosetting barrier insulation lock the sections into a unit of great mechanical strength. Coils have been subjected to short circuit tests using 50 times normal current (two times as great as the industry standard) without failure.

The HI-THERMAL-CAP element, which combines this improved coil with a wound core of cold-rolled oriented grain steel, has excellent electrical characteristics: low impedance for better voltage regulation; low core and copper loss for economical operation. You get full efficiency plus high capability with new Wagner HI-THERMAL-CAP Transformers.

HI-THERMAL-CAP Transformers, built in single-phase ratings 167 Kva and smaller, 15 KV and below (for direct pole mounting), are now available from factory, branch, and distributor stocks. Your Wagner Sales Engineer has complete information. Consult him, or write us.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation

6440 PLYMOUTH AVENUE, ST. LOUIS 33, MISSOURI

WT60-208

JOSLYN
welded screw
ANCHORS

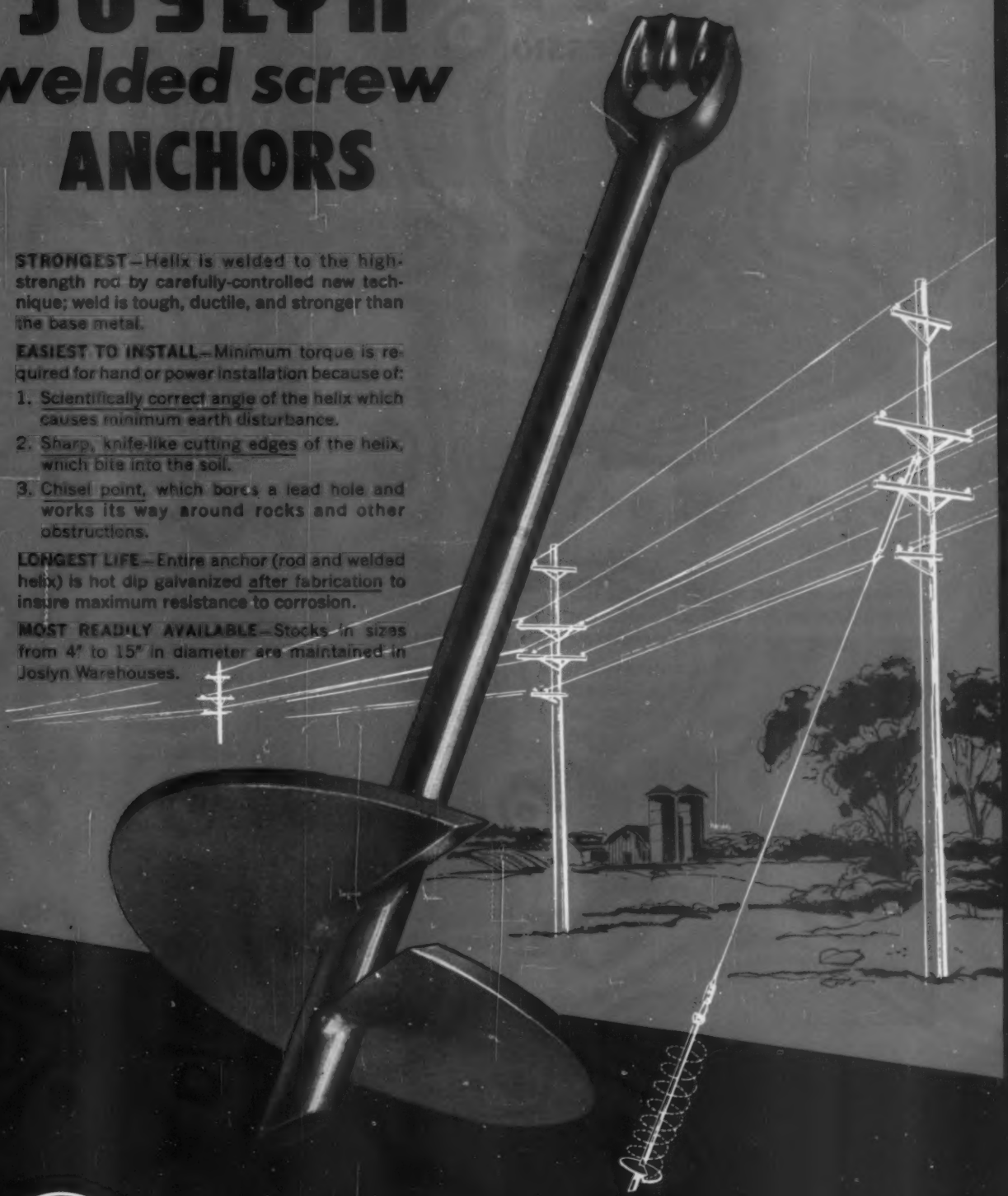
STRONGEST—Helix is welded to the high-strength rod by carefully-controlled new technique; weld is tough, ductile, and stronger than the base metal.

EASIEST TO INSTALL—Minimum torque is required for hand or power installation because of:

1. Scientifically correct angle of the helix which causes minimum earth disturbance.
2. Sharp, knife-like cutting edges of the helix, which bite into the soil.
3. Chisel point, which bores a lead hole and works its way around rocks and other obstructions.

LONGEST LIFE—Entire anchor (rod and welded helix) is hot dip galvanized after fabrication to insure maximum resistance to corrosion.

MOST READILY AVAILABLE—Stocks in sizes from 4" to 15" in diameter are maintained in Joslyn Warehouses.



JOSLYN COMPLETE POLE LINE EQUIPMENT

JOSLYN MFG. AND SUPPLY CO.

155 N. WACKER DRIVE • CHICAGO 6, ILLINOIS

GET THE BIG 3

IN COMPRESSION-CONNECTOR TOOLING

1

Y10M

Light-weight hand tool installs a wide variety of HYDENT® connectors on wire sizes #22 thru #10. A wire cutter and single indentor die for all wire sizes are in the nose of the tool. Other features are wire stripper, bolt cutter, thread chasers, and dies for closing insulation-grips.

$3.95 ea.

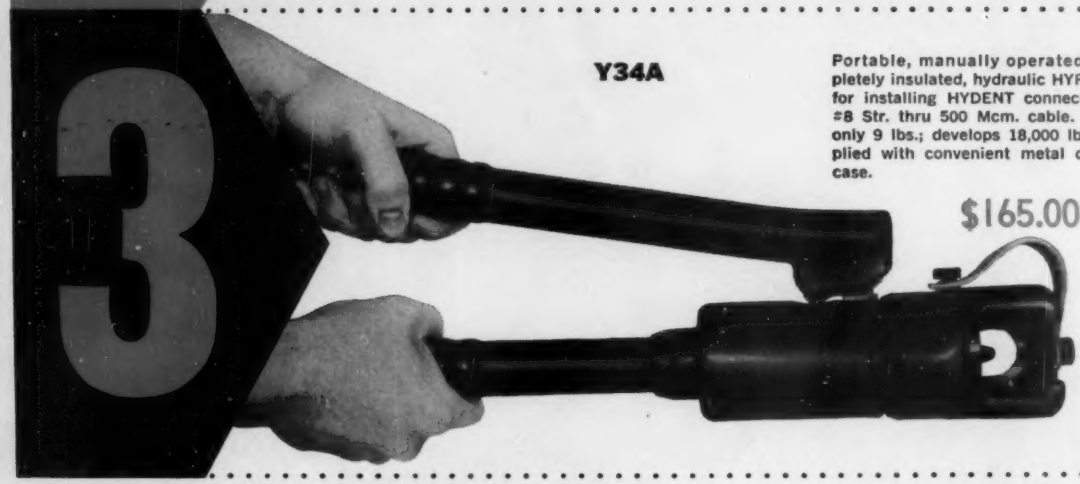
2

MY29-3

This HYTOOL® features one easily adjusted die set that installs HYDENT on commercial copper cable from #8 to 250 Mcm. and on aluminum conductors #8 to 4/0. Indexing plates are used for setting adjustable nest die for either copper or aluminum. No dies to install, change, identify or lose.

$39.50 ea.

3



Y34A

Portable, manually operated, completely insulated, hydraulic HYPRESS® for installing HYDENT connectors on #8 Str. thru 500 Mcm. cable. Weighs only 9 lbs.; develops 18,000 lbs. Supplied with convenient metal carrying case.

$165.00 ea.

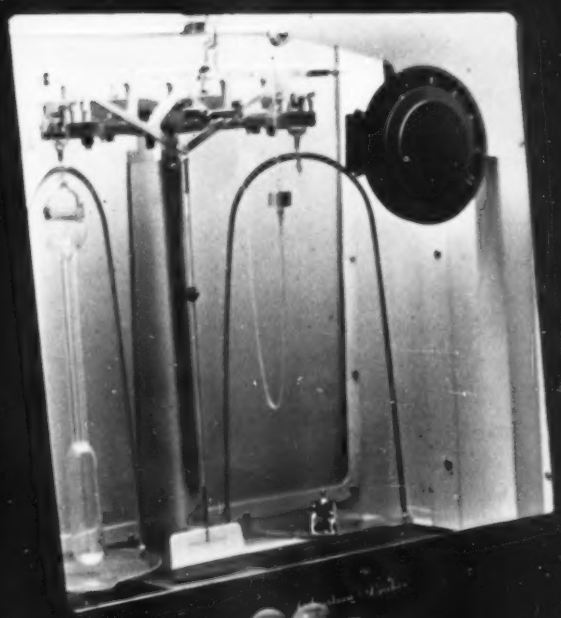
Contractors with an eye on cutting connector installation time count on the Burndy Big 3. This Y10M, MY29-3, Y34A combination crimps practically every type and size compression connector on any job...adds the versatility, speed, and economy that result in profitable jobs. See your local Burndy distributor for demonstration.

BURNDY

59-15

Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

RESEARCH AND DEVELOPMENT AT MOLONEY



the Policy...

Our business is more than the production of transformers. It is to provide SOLUTIONS TO transformer PROBLEMS.

Our objective is to demonstrate that—Moloney Electric Company provides flexible, expert and prompt service in finding solutions to specific problems of transformation—solutions that:

- Answer the needs of changing and growing utility loads.
- Keep transformation costs, including installation and maintenance, below the upward trend of general cost increases.
- Eliminate every possible element of economic waste.
- Give every person responsible for transformer purchase or performance an assurance of standards he can count on. To make each person say to himself, "I want Moloney to assist in solving my transformation problems."

This policy and our experience, resources and personnel make Moloney Electric uniquely qualified to serve utilities in every phase of transformation research, development, design and production.

MOLONEY ELECTRIC

Research and Development at Moloney:

the people . . .

The manpower and expense budget for research and development at Moloney is not assigned on a predetermined percentage-of-sales or other formula. The resources in men and money for this essential work are determined in the light of our fundamental policy to lead in transformer improvement and to achieve specific results for customers with particular problems.

Five standing committees of key management and technical executives—including a Program Direction Committee, of which the President and Chairman of the Board are members—set specific and practical goals for research and development projects and keep problems and progress under constant review.

The people of our Research and Development Department are the nation's most specialized technical group in the transformation field. A staff of graduate electrical, mechanical and chemical engineers—specialists in every phase of transformation technology—is constantly employed in engineering design, research and development.

The consultant services of the nation's ablest independent experts, both academic and industrial, in every phase of theoretical and applied research relating to electricity are continuously available to Moloney staff researchers. These experts are on year-round retainer and are present in the Engineering Department on a regular basis.

MOLONEY ELECTRIC

MOLONEY

Manufacturers of Transformers

SALES OFFICES IN ALL PRINCIPAL CITIES

the problems . . .

Every theoretical or practical idea that appears to be related to better transformation is subject matter for thorough, constant and programmed study: chemical compatibility of materials, magnetics, electrical characteristics, insulation, heat transfer, sound, mechanics —in all these and other fields, systematic investigations and experiments—keyed directly to transformer performance—lead to improved transformation through better materials and better design.

As major electric utilities are, in increasing numbers, setting up their own departments of research and development, Moloney Electric's research is ever more closely geared to specific projects and goals suggested by individual customers.

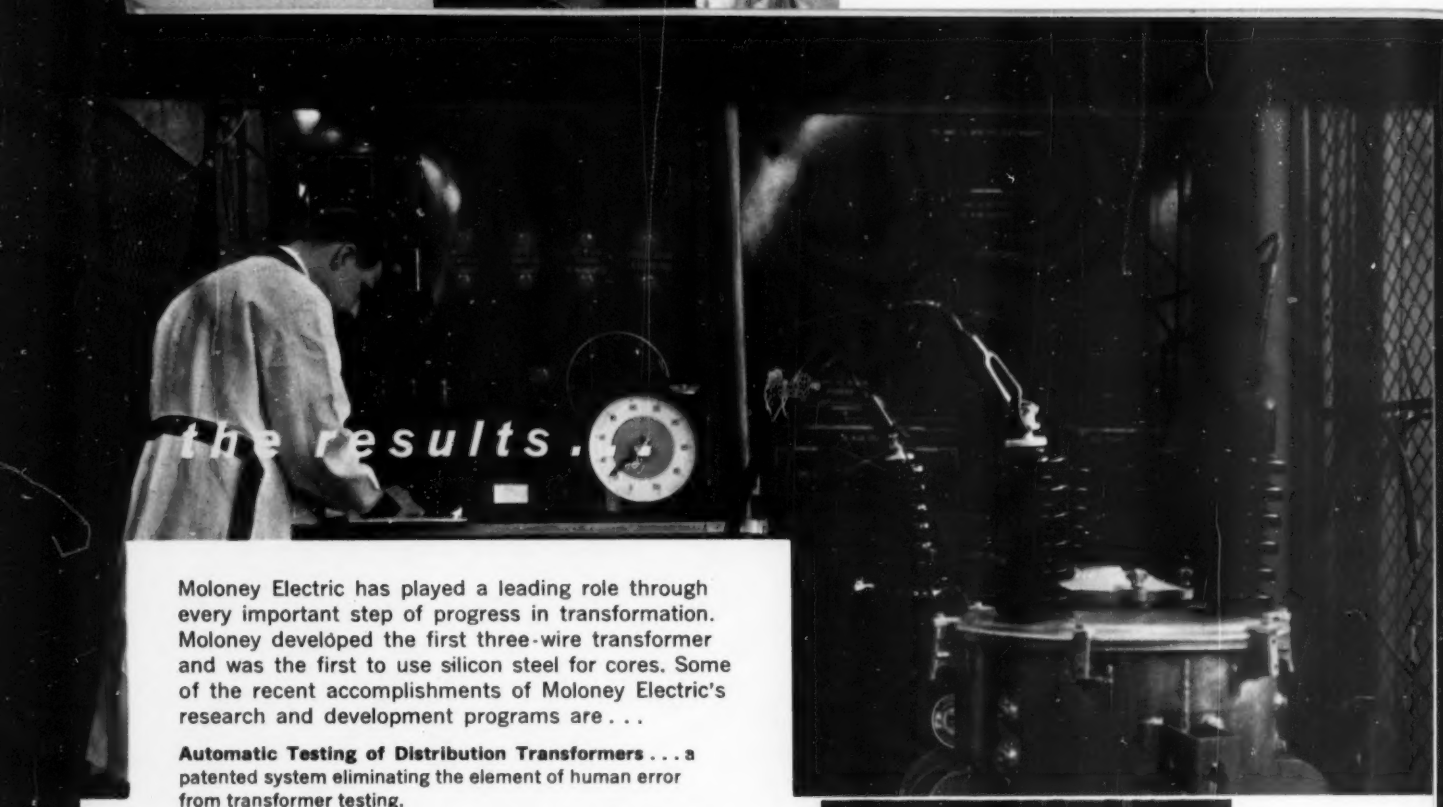
Moloney Electric's emphasis on the importance of research and development has been recognized by major corporations that produce materials for transformer manufacture. These suppliers work cooperatively with Moloney in research that has produced significant product improvements and now promises a number of basic forward developments.

Contributions of Moloney research people benefit not only customers and suppliers, but the entire electrical industry. Currently we are taking part in the joint AIEE-NEMA program to develop an accelerated, functional, life testing method for distribution transformers, and to establish a new loading guide.

ELECTRIC COMPANY

for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA



Moloney Electric has played a leading role through every important step of progress in transformation. Moloney developed the first three-wire transformer and was the first to use silicon steel for cores. Some of the recent accomplishments of Moloney Electric's research and development programs are . . .

Automatic Testing of Distribution Transformers . . . a patented system eliminating the element of human error from transformer testing.

Corrosion Resistant Tanks . . . made of special aluminum alloys to prevent deterioration of the metal under extreme corrosive conditions.

Moloney Core . . . a new Distribution Transformer core design, reduces losses, exciting current and sound levels.

Corrugated Network Tanks . . . the first continuously corrugated network transformer tanks.

Duratherm Insulation . . . a new high temperature insulation permits operation at increased KVA, or increases transformer life expectancy.

SR New Core Steel . . . the application of a special new core steel makes possible a significant reduction in power transformer sound levels.

"Distributionized" Power Transformers . . . 15 KV, 3 phase transformers, 1500 KVA and below, designed using distribution BIL and without the usual accessories. The result is a smaller, lighter transformer without a sacrifice in performance or overload capabilities.

138 KV Terminal Chamber . . . a special two-compartment terminal chamber to terminate high pressure pipe type cable and positively isolate cable oil from the transformer in the event of a cable leak.

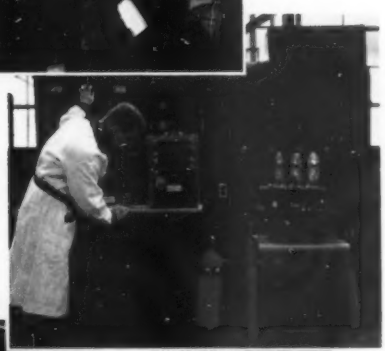
Double-Circuit Integrated Substation . . . a complete substation assembly including LV switching equipment, LTC, line dead-ending provision, etc., for economically serving outlying areas.

Unitran . . . single and three phase pad-mounted transformers for use on underground distribution systems.

Reactor By-pass Switching . . . an exclusive, patented LTC principle affording savings in maintenance and operating expenses.

All-aluminum Power Transformer . . . a 3750 KVA unit having all metal components, except the core, made of aluminum.

Duracoat . . . a new, weather resistant, high dielectric coating for distribution transformer covers.



MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

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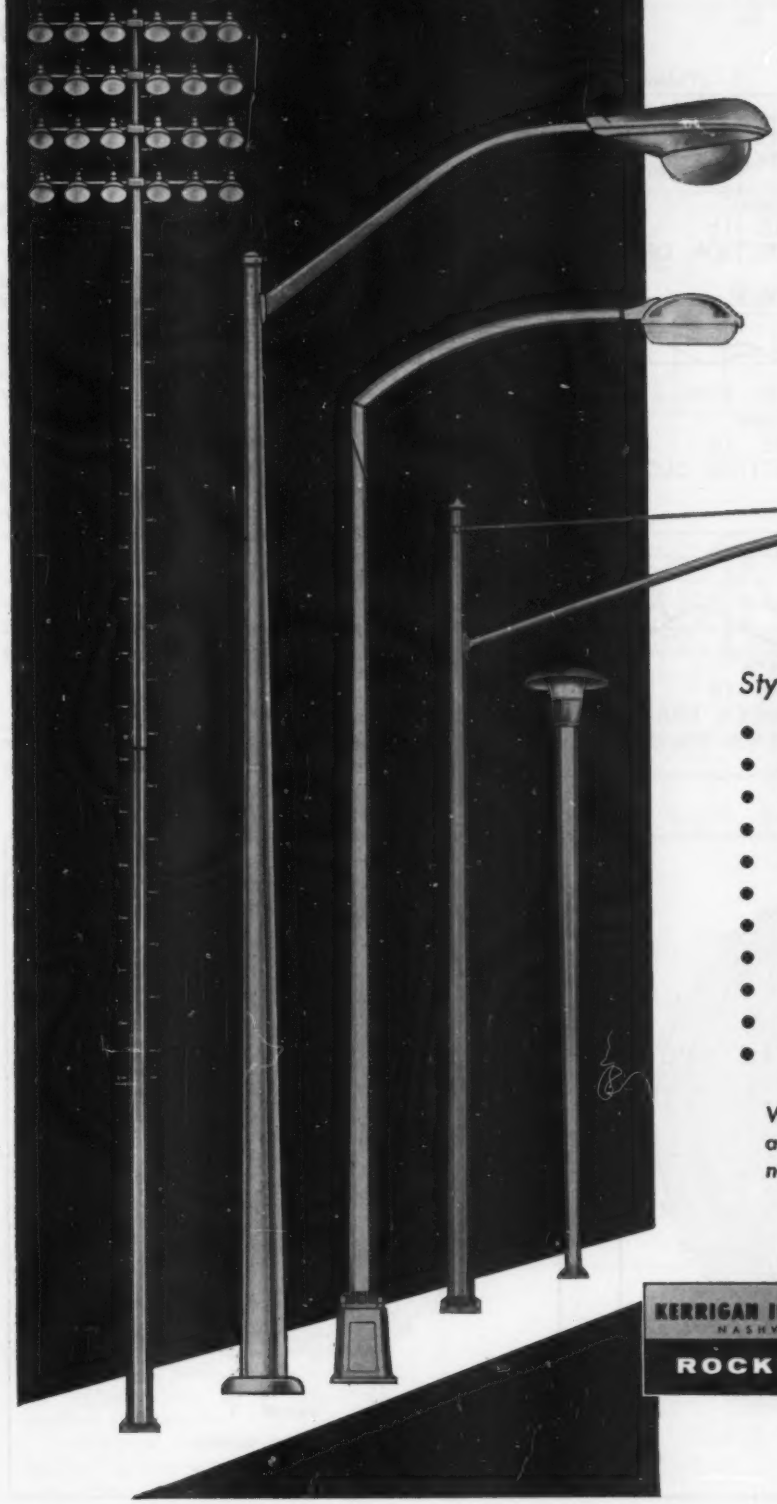

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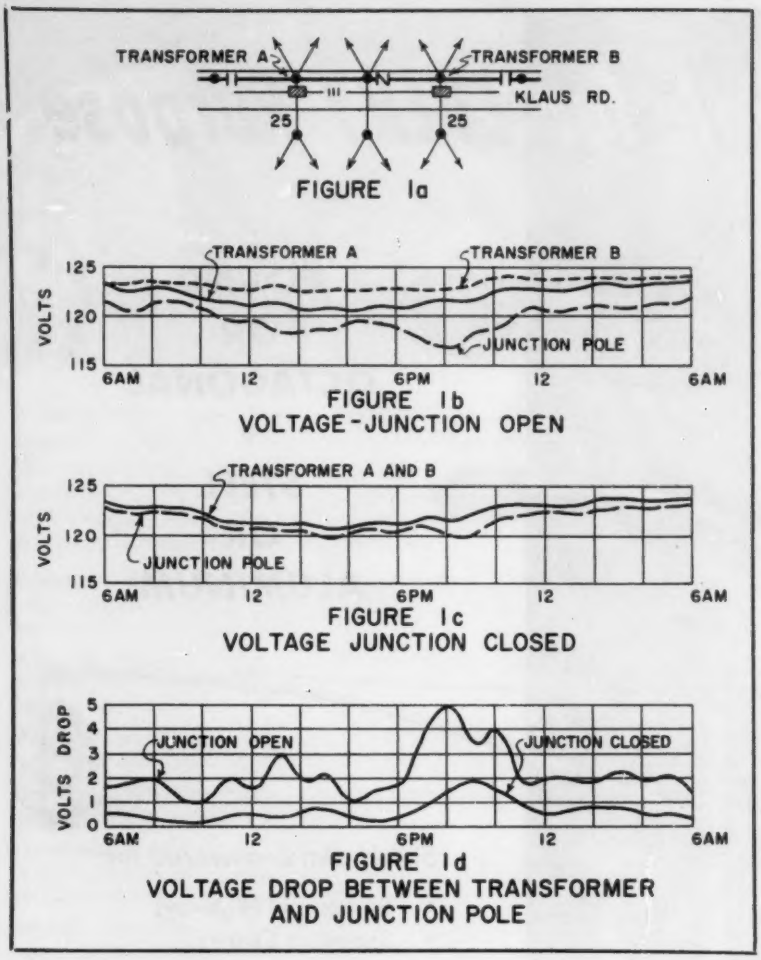


FIGURE 1a

FIGURE 1b
VOLTAGE-JUNCTION OPEN

FIGURE 1c
VOLTAGE JUNCTION CLOSED

FIGURE 1d
VOLTAGE DROP BETWEEN TRANSFORMER AND JUNCTION POLE

Review of

Henry J. Ford
Test and Records Engineer
City Public Service Board
San Antonio, Texas

◆ RESIDENTIAL LOADS have increased by leaps and bounds in the last few years. There seems to be no end to new appliances, many with motors that are becoming larger and larger. Single-phase air conditioners with five and even seven and one-half horsepower motors are rapidly replacing the smaller window units in many homes.

With television receivers reaching the saturation point, many customers are becoming critical of voltage dips and fluctuations. The increase in motor operated appliances will not help this situation.

Banked secondaries offer improvements in the secondary distribution system that should not be overlooked by the distribution engineer.

Advantages of banking

Voltage levels are usually higher on banked secondaries than on

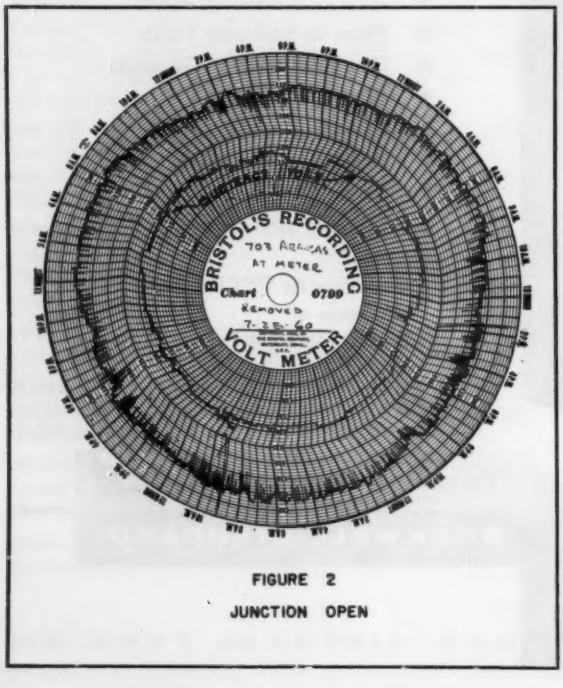


FIGURE 2
JUNCTION OPEN

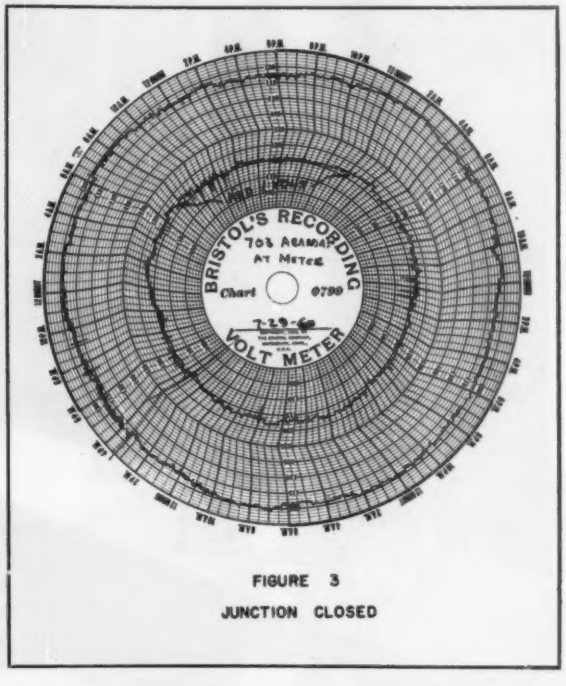


FIGURE 3
JUNCTION CLOSED

banked secondary experience

secondaries served by single transformers. This is caused by a reduction in demands on the transformers in the banked group because of the diversity of demands among a larger group of customers. This advantage may almost disappear, however, when high ambient temperatures cause loss of diversity on air conditioners.

Figure 1b shows the secondary voltages at two banked transformers, connected as shown in Figure 1a, and at the junction pole with the junction open. Figure 1c shows the voltages at the same points with the junction closed. Figure 1d compares the voltage drops between the transformer and junction pole under these two conditions.

With banked secondaries, voltage dips caused by motor starting are greatly reduced. High starting currents split at the secondary main and are supplied by more than one transformer. The voltage dip for a given starting current will usually be 50% less than when supplied by a single transformer. In many cases, it may be as much as 75% less.

Figure 2 shows a voltage test made as a result of a complaint. After the test was made, the junction point between transformers was found to have been left open. Figure 3 shows the voltage after the junction was closed.

With banked secondaries, transformer capacity is used more efficiently. In cases where there is enough diversity in demand, transformer capacity may be reduced or load increase may be made without an increase in transformer capacity.

Figure 4a shows the load on two transformers with the junction point open between them. Figure 4b shows the loads with the junction point closed. The load on transformers A and B has been very nearly equalized.

Smaller secondary wire may be installed for a given voltage drop or wider spacings of transformers may be used without an increase in voltage drop as a result of banked secondaries.

In the past, secondaries could be banked in two ways:

(1) Secondary mains could be

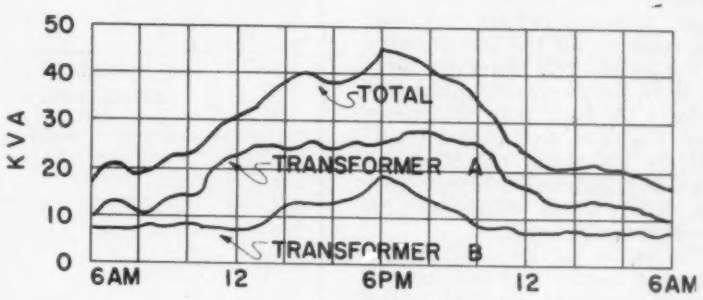


FIGURE 4a
LOADS WITH JUNCTION OPEN

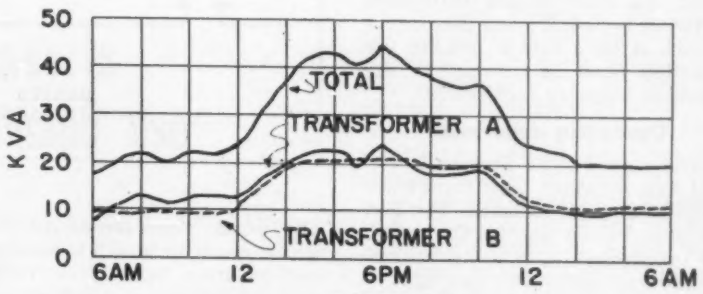


FIGURE 4b
LOADS WITH JUNCTION CLOSED

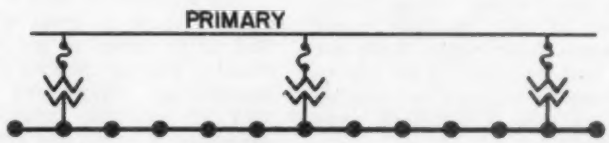


FIGURE 5a
SOLID SECONDARY

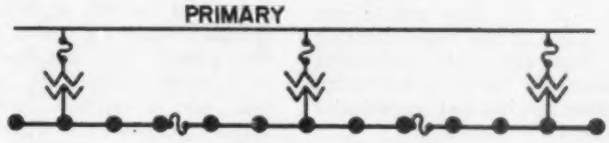


FIGURE 5b
FUSED SECONDARY

connected solidly between transformers, as shown in Figure 5a.

(2) Secondary mains could be fused at the midpoint between transformers, as shown in Figure 5b.

Solid secondary mains have all the advantages of banked secondaries but with certain disadvantages. A secondary fault may blow the fuses on all the transformers in the group. This interrupts service to all the customers on the secondary. A fault may sometimes blow the fuses on adjacent transformers but might not blow the fuses on transformers farther from the fault, which could lead to transformer burnout.

To restore service after all the fuses are blown, it is necessary to close the majority, if not all, of the fuses at the same time.

Fuses at the midpoints between transformers eliminate the disadvantage of the solid secondary by isolating the faulted section. However, the fuse cannot distinguish between temporary and permanent faults. After a case of trouble, the junction must be re-fused or the banking becomes ineffective.

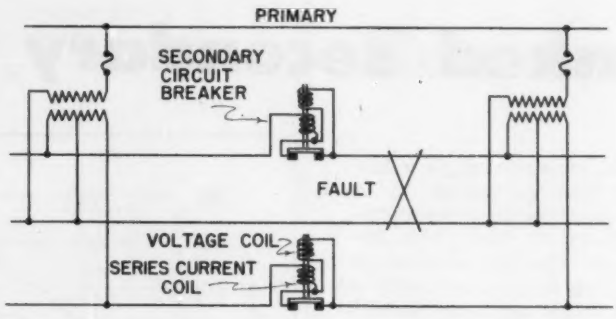


FIGURE 6
BANKED SECONDARY WITH BREAKERS

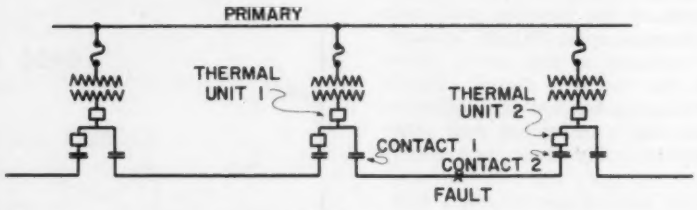


FIGURE 7
BANKED SECONDARIES
WITH TRANSFORMERS DESIGNED FOR BANKING

Operating experience

The City Public Service Board has had a rather long experience with banked secondaries. The San Antonio Public Service Company, its predecessor, was using banked secondaries about 40 years ago.

Until about 1930, a fuseable secondary switch was used at the junction points between transformers. These switches were fused with ordinary fuse wire and there was no easily visible indication to show when it was blown. Because of this feature, many fuses were blown which were not found and re-fused. This led to the disuse of banked secondaries as far as new installations were concerned.

About 1935, extensive tests were made to determine the effectiveness of banked secondaries. These tests indicated the advantages listed above, so the use of banked secondaries was reinstated.

A new indicating fuseholder was available at this time and it was used in place of the non-indicating type. However, this indicating fuseholder did not help too much in keeping the banked secondaries in an operative condition.

San Antonio is a city of trees in the residential areas and despite a continuous tree trimming program, we have lots of trouble with them. Thunderstorms with their high winds cause secondary faults which result in blown transformer and junction fuses. The trouble men are interested in getting service restored to everyone as soon as possible. This can be done quickly by re-fusing the transformer and forgetting about the junction fuse.

The number of blown junction fuses became so great that steps had to be taken to get them re-fused or give up the idea of banked secondaries. Once each year or two all available linemen were organized in crews and given maps with specified area assignments. All junction points were checked and re-fused on one Saturday.

Junction breaker developed

About this time, Ralph Brown, of our Engineering Department, conceived the idea of an automatic circuit breaker for use at the junction points. This breaker consists of a series current coil, a voltage coil, and a current interrupting contact, as shown in Figure 6.

The current coil operates a plunger connected to the contacts. The voltage coil is shunted out of the circuit as long as the contacts are closed. When the contacts are opened and the secondary on one side of it goes dead, the voltage coil holds the contacts open.

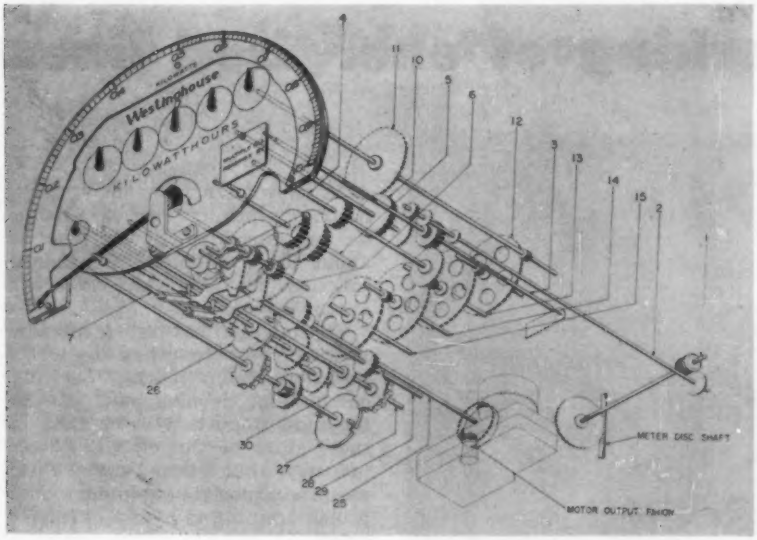
This breaker solved the problem of blown junction fuses. In case of a secondary fault or overload, the transformer fuse blows and the breakers in the secondary connected to that transformer open. When the trouble is cleared and the transformer re-fused, the secondary on both sides of the breaker is energized. The voltage across the voltage coil drops to almost nothing and the contacts drop closed.

We initially installed 200 of these breakers for trial and later increased this to 1000. After a year or more of field use, the linkage between the plunger and the contacts began to give trouble. The linkage would bind and not allow the contacts to close properly.

The entire linkage and contact structure was redesigned to eliminate this trouble and include more positive contact pressure.

At the present time, we have approximately 210,000 kva of distribution transformers connected to banked secondaries. These transformers are in about 3500 groups. The number of transform-

(Continued on page 105)



This perspective drawing shows components of the new demand register.

Dual-range register converts watthour meter for demand use

By R. V. Adams
Meter Department
Westinghouse Electric Corp.
Raleigh, N. C.

◆ DEMAND DEVICES have been used in the United States for about 60 years to measure the rate of power consumption, so that consumers of electrical energy can be equitably charged for the equipment that is necessary to supply their maximum need for electrical energy.

In measuring this maximum demand, mechanical demand registers are normally driven by a watthour meter disc so that they count the meter revolutions over a stipulated period of time—usually 15 or 30 minutes—called the interval.

Through proper gearing mechanisms and a pusher pointer, this count of revolutions is transferred to a pointer which indicates, on a scale graduated in kilowatts, the highest consumption sustained throughout the interval. This process is repeated for every interval throughout a month. From the position of the maximum reading pointer, the maximum demand occurring in the month is available at the end of the reading period.

The new Mark I demand registers recently announced by Westinghouse permit conversion of watthour meters to watthour demand meters, equipment which is identical to watthour meters except for the addition of the demand register and its necessary components: two lead connections for the motor and a large glass cover with a mechanical reset.

The mechanical demand register gives a combination of the kilowatthour consumption, just as does the standard kilowatthour register, and in addition, gives the maximum kilowatt demand over a definite time interval by means of a pointer moved over a graduated demand scale.

The Mark I register will be available in all required capacities, and with a combination class 2 and class 6 scale range or a combination class 3 and class 5 scale. Intervals will be 15, 30, and 60 minutes with the provision that up to four-hour intervals can be made. The Mark I easily mounts on all "D" line watthour meters without extra transfer gearing or meter recalibration. It is available with four or five interlocking or noninterlocking kilowatthour dials.

A clutch in the motor gear train allows advancement of the time interval mechanism by hand. An indicator on the front of the register shows how much of the time interval has elapsed and when the interval is completed. Only three adjustments are necessary for calibrating the register: two zero adjustments and a black pointer friction adjustment, all of which are on the front of the register.

Although the new Mark I mechanical demand register accomplishes the normal functions of a demand register—that is, it provides both a kilowatthour reading and a demand reading—it does it in a unique way. The most important of its distinctions is that the register has two operating ranges and is actually two registers in one.

With the growth in connected loads recently experienced, the two demand ranges of the new demand register have special importance. They allow installation for today's loads, yet can be changed in the field to meet future higher loads. In this equipment, the demand range can be changed simply by reversing the scale plate on the front of the register. In so doing, a tab on the scale plate depresses a pin that performs a simple gear change which in turn doubles the range of the demand portion of the register. However, this does not affect the kilowatthour gearing or reading. By designing the demand register so that the scale tab changes gears, positive interlocking between scale reading and gearing is provided.

A second feature is that the open time—the time required to return the pusher pointer to zero at the end of each interval—has been reduced from typical values of six or seven seconds to practically zero. To do this, two pusher pointers are used alternately. Changeover from one pusher to the other is accomplished by snapping an armature from one magnetic clutch to another at the end of each interval. The unused pusher pointer is returned to zero by cam action from the motor gear train.

Description of operation

The following is a description of the operation of the Mark I demand register. Numerical references refer to the accompanying illustration.

(Continued on page 105)

Bare hand working of energized lines

A fiberglass bucket is hoisted to overhead wires by a truck-mounted aerial boom, which is insulated from ground. Outriggers on the truck provide stability. A metal mesh lines the bucket, and is connected by clamps to the conductor on which the men are working, thus charging itself and the men in the bucket at the same voltage as the line on which they are working, and preventing current flow.

◆ A REVOLUTIONARY new technique of working with bare hands on an energized power line is about to be adopted as standard practice on American Electric Power System lines.

Thoroughly field tested, the new method was described by AEP President Philip Sporn as "a truly outstanding development, one of the most important in its field in the history of the electric power industry," but warned that its use required special equipment and proper training to insure linemen's safety.

The new technique is a simple one. It is the reverse of conventional practice and utilizes the principle that current does not flow when there is no difference in voltage between two points. Heretofore, a lineman has performed his work while grounded and insulated from the live conductor by protective devices such as rubber goods and insulated hotsticks.

With the new method, the lineman is charged at the same voltage as the line on which he is working—a phenomenon of which he is not even physically aware—and protected from ground by effective insulation.

"It's the same way with birds," Mr. Sporn explained. "They can perch on electric wires—even high-voltage lines — with nonchalance, because they are not in contact with the ground. When they alight on a wire, they merely become charged or energized to the voltage of the line itself, and in this process they are not hurt."

Four major benefits

In emphasizing the significance of the development, Mr. Sporn pointed out four major benefits:

(1) Further improvement of today's reliable electric service to customers by insuring service continuity through eliminating interruptions for line repairs;

(2) Reduced line maintenance costs brought about by savings in both time and manpower;

(3) Simplified working conditions, permitting linemen to work without cumbersome tools and equipment; and

(4) Greater safety in many

made possible through new technique

cases than with the use of live line tools in conventional practice.

Fiberglass bucket used

Linemen work while standing in a fiberglass bucket hoisted to overhead wires by a truck-mounted insulated aerial boom. The bucket is lined with a metal mesh that is connected by clamps to the conductor on which the men are working, thus energizing the screen and the occupants at the same voltage as the line.

Their safety is provided by the insulated boom which protects them from the difference in voltage between the ground and the live conductor.

Harold L. Rorden, high-voltage practices engineer for the AEP Service Corp., New York, developed the basic idea and supervised the research and testing. He was assisted in the development work by Merle L. Fisher, of Canton, Ohio, transmission superintendent of the Ohio Power Company, an AEP System operating company.

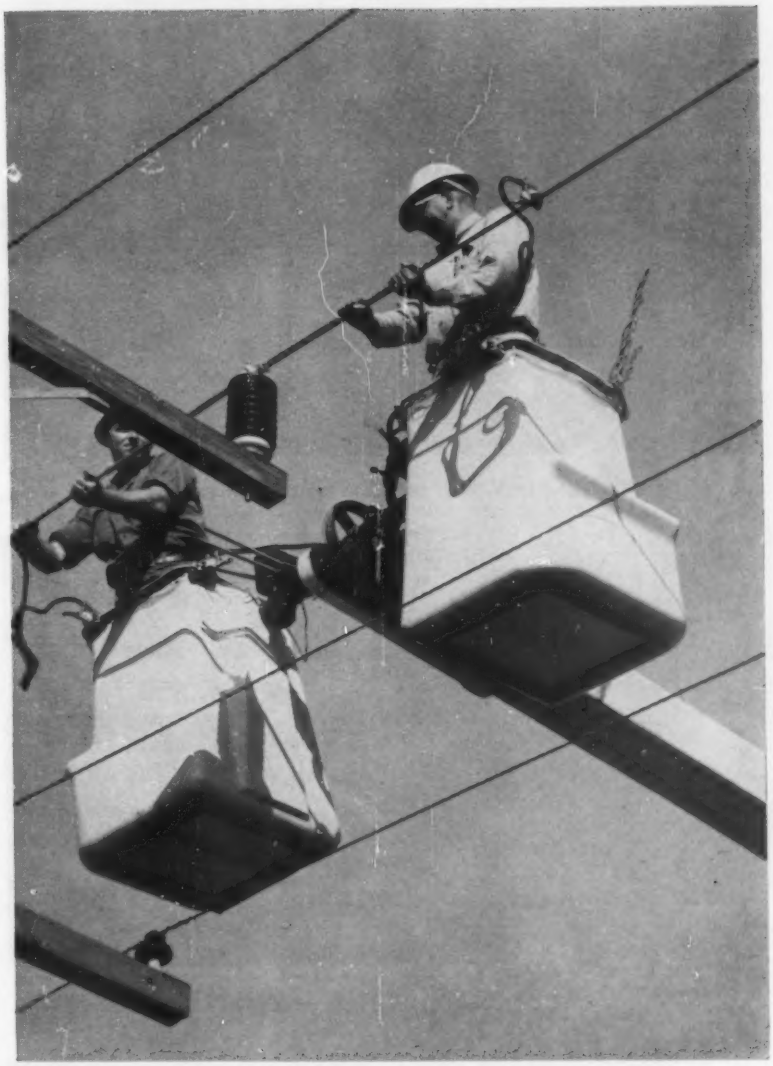
Holan Corp., Cleveland, manufacturer of hydraulic derrick trucks and aerial lifts, and its parent company, the Ohio Brass Co., cooperated in the tests and supplied equipment. The laboratory work was carried out in the Ohio Brass high-voltage laboratory, at Barberton, Ohio.

Boon to linemen

The new equipment is a real boon to linemen. For years they have worked on hot wires with special tools attached to long insulated poles, called hotsticks, and while hanging from wooden poles or steel towers by their safety belts. It was a difficult job made more difficult by cumbersome working procedures which were necessary for safety.

Now, linemen can stand in front of the line and work comfortably on it with their bare hands or when wearing ordinary work gloves.

In working near the pole structure, as for example in changing out an insulator, the lineman will consider the wood crossarm and the insulator items touching the crossarm to be at ground potential.



Linemen can now stand in front of the line and work comfortably on it either with bare hands or when wearing regular work gloves. No longer must they hang precariously over their work by safety belts.

This is because the pole could be damp and could pass enough leakage current to kill a man connected to the line.

In practice, the insulator nut is removed before the bucket is raised to the height of the line. Then the men move the bucket up and connect to the line so they can change out the insulator. After the insulator is in position, they disconnect from the line, drop the bucket, and replace the nut on the insulator bolt. Using this procedure, they could either use live-line tools or work with their bare hands and ordinary wrenches on the ground potential items. The company prefers to use the live-line tools as a precautionary measure.

Savings in time will be major. For example, in conventional line work and under ideal conditions, approximately five manhours are required to change an insulator on a 34,500-volt wood pole line. With

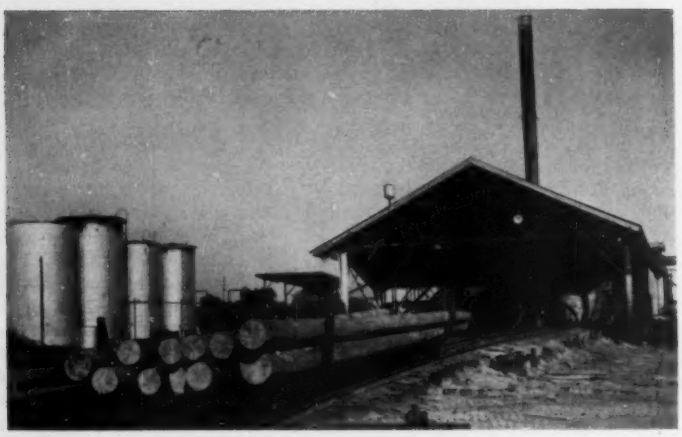
(Continued on page 105)

Multi-step process transforms

From bark-covered logs such as these will come crossarms and poles.

A pole passes through the peeler.

After peeling, pole goes to hand finishing.



Load of poles awaiting entry into the treating cylinders.

Pole brand shows pertinent data.

pine to pole

By Charles L. Wiley
General Pole and Crossarm Co.
Div. of General Cable Corp.
New York, N. Y.

◆ UTILITY POLES are the most overlooked and ignored objects in sight. Indispensable and solid as these ubiquitous bearers of the country's power and communications are, if they leave an impression at all, it is that of functional, uniform hulks pushing themselves into view.

Otherwise they are taken for granted by all but two kinds of people: the photographer, to whom the starkness of the smooth weathered length appeals as a symbol of sturdiness, and the men who are professionally involved in the careful processes that go into the making of these poles.

Before a utility pole is set up to carry wires and cable for power and communications, or even as a target for the careless motorist, it must undergo a complete transformation. A series of beauty treatments, as it were, preserves the poles from the ravages of time and the elements, as well as from the myriads of bugs, insects, and bacteria that tend to shorten their lives.

A pine utility pole manufactured by General Pole and Crossarm Company is used as a street lighting standard in Ft. Pierce, Fla.

Forest to factory

From the pine forest or the tree farm, raw poles are trucked to the Palatka, Fla., plant of the General Pole and Crossarm Company where beauty treatment begins. Here the poles are unloaded and stacked so that full advantage can be taken of their shape for easy rolling onto conveyors.

The logs are moved along the conveyors to the modern and new automatic peelers which remove the bark and bumps. Now the new look is beginning to show. Great lengths of clean, smooth poles have emerged ready for selection and placing in graded stacks for seasoning.

At the most appropriate moment for further manufacture and treatment, the poles are brought in from the storage piles and carefully selected and processed according to the customers' requirements. To meet the many different specifications, each pole is put through the various operations known as "framing."

The tip is carefully and precisely cut into a double, single, or flat "roof." One face may be flattened by specially designed cutting equipment so as to provide a slab gain or flat surface to accommodate several crossarms, or separate mortise gains, each intended to hold a single crossarm, may be cut into the pole. At the same time, holes are bored at specified locations for the bolts which will hold the crossarms and braces in place.

Each pole is then branded with symbols indicating the company and plant of manufacture, the year of manufacture, its species, and the preservative used and its size and length. Numerals indicating size and length are also hammered into the butt. As a result of these operations, the customer is assured of a quality, factory-finished pole made by trained people and is saved much time and expense on the job.

After all of this, the poles are inspected and placed on small rail cars called "trams" and carried into the cavernous treating cylinders long enough to accommodate the longest lengths generally used.

(Continued on page 103)

Comment on modern meter construction

By Nick Newton

Division Meter Supt.
Arkansas Power and Light Co.
Harrison, Ark.

◆ CONSTRUCTION FEATURES in watthour meter potential coils are very much superior today over those made some 20 or 30 years ago. They have been "insulated," "impregnated," "acetated," and "encapsulated" until they are just about indestructible.

These features enable modern meters to operate under conditions which would have rendered their predecessors useless, or at best, inaccurate. Where older meters would have indicated an abnormal condition by coil failure or some other perceivable change, our meter of today goes merrily along, uncomplaining and revealing nothing amiss.

We have come a long way toward "toughening up" our watthour meters, and the manufacturers are due a lot of credit. Credit is due, too, to the users who complain about inferior features until the manufacturers come up with something better.

Errors may go unnoticed

Unfortunately, however, these sturdy features and structural improvements can, in a manner of speaking, bite the hand that feeds them. Errors of installation can go unnoticed for long periods of time, and the utility can be put in a bad light in the eyes of the customer when these errors are finally discovered. And sometimes it requires some head-scratching and intelligent maneuvering to convince the customer that the error was not intentional; and more head-scratching to arrive at an acceptable adjustment.

I'm thinking specifically of an incident that happened on our company property, in which a late model, 120-volt, two-wire, single-phase meter was installed in a socket that had been wired for a 240-volt, three-wire meter. Voltage across the potential coil of this meter was double the rated nameplate voltage, yet this meter never faltered, or gave any indication of an abnormal condition, and the error was not discovered for more than 18 months.

It is needless, after something of this sort happens, to speak of the laxness on the guilty employee's part, except to impress upon him the seriousness of the error. The damage is done, regardless, and the job at hand is to handle the resulting complications to the satisfaction of the customer and the company. And sometimes this little chore can be a lulu!

In our case, the error was discovered by a relative of the customer; his son, in fact, who had considerable background in electrical work in general, and meter work in particular. Figuratively speaking, the stuff really hit the fan when this relative, using a voltmeter and his knowledge of meters, found our boner. He had us dead to rights.

The customer, after talking to his observant and enlightened son, naturally assumed that he had a 50 per cent rebate coming. If the meter had registered twice as much as it should have, then he had paid twice as much as he should have over a period of 18 months. This was, or so he thought, a reasonable and fair assumption.

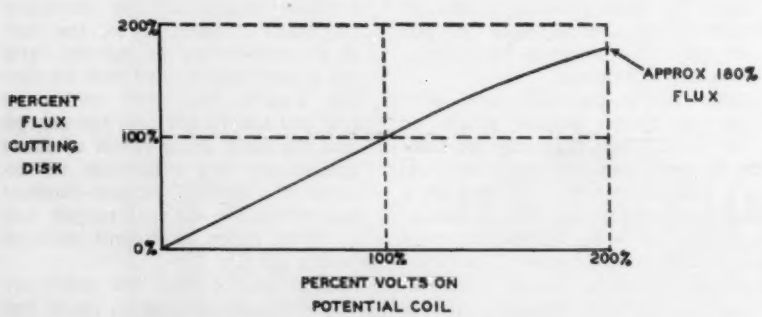
Adjusting the complaint

What would you have done if the responsibility of adjustment with the customer had depended on your thinking and analysis of the situation? (Not to mention the job of smoothing it over with your superiors.)

In the first place, the meter will not register 200 per cent when energized with 200 per cent voltage, even when all the load is taken from the current coil side of the meter to the neutral, as was the case in this instance. Tests in various meter shops have proved that, depending on the make and model of the meter and the type of steel used in the core material of its element, the flux on the meter disk will not keep pace with the increase in voltage across the potential coil.

At 100 per cent voltage the flux is 100 per cent on the disk, but as the voltage increases, and approaches 150 per cent, the flux begins to fall off until, at 200 per cent voltage the flux cutting the disk is in the neighborhood of 180 per cent. Saturation of the steel in the core material accounts for this fact. This phenomenon is illustrated in the accompanying graph.

We did not consider this, however, when figuring the credit due the customer. We anticipated enough difficulty in convincing him that he was not entitled to a 50 per cent rebate because of the progressively lower-price blocks in the rate schedule, without adding technicalities to our problem. And, incidentally, though the customer has little difficulty digesting rate breakdowns in which he is entitled to a lower rate as he uses more current, it is sometimes a bit more difficult to make him understand it when conditions are re-



Applying double voltage to a 120-volt meter potential coil doesn't result in 100 per cent increase in registration. As this chart indicates, the flux cutting disk only increases about 80 per cent.

versed, and the amount of money due him is lessened because of these lower rate blocks.

Our rate schedule begins, "3.9 cents for the first 60 kwh, and 2.9 cents for the next 140 kwh." With the meter disk rotating "double" speed, and the readings on the meter indicating a consumption of 200 kwh, for instance, the customer paid $6.40. The customer's rebate was not $3.20, however. Figuring half of the 200 kwh on the same rate schedule, his bill should have been $3.50, making his credit due only $2.90.

When all his bills had been refigured in the above manner for the 18-month period during which the condition had existed, the total rebate due the customer amounted to a little more than a third of his total bills, rather than the 50 per cent that he had anticipated. He was a little dubious about the final figure, but apparently our explanation as to how it came about was to his satisfaction, and he offered no further objections.

Meter could register less

Another question that might arise when one really ponders a situation of this kind is, under the pressure of double voltage, will the meter always register more than it would under normal voltage? The answer is, "No." In fact, it is entirely possible that the meter might not register anything, even though it is in good condition and the customer is pulling a good load.

This possibility can become an actuality when the conditions are exactly the same as we have been talking about, with the exception that the load is taken on the other side of the meter, or switch, to the neutral. In this condition there would be no current coil in the circuit, only a jumper where the current coil should be, and the meter would "see" nothing.

This condition, however, doesn't pose too much of a problem in adjustment. Past records can be used to arrive at a feasible figure due the company, or, if past records on the customer are not available, an estimate can be made by figuring connected appliances, number of rooms, size of family, etc.

The real headache occurs, in a situation of this sort, when load is taken from *both* sides of the meter to the neutral. When this happens to us, we will have a live one! How much load, for example, will be from the current coil side to the neutral, causing the meter to register 200 per cent, supposedly; and how much will be taken from the jumper side to the neutral, with a resulting zero registration?

To date, we have not had this problem to face, and, I suppose, it is just as well. If it should come up, however, I believe that it could be worked out, assuming a reasonably balanced load on each side of the neutral, by using a combination of the foregoing procedure to arrive at an answer. That is, estimating the amount that did not register, then halving the amount that did, and adding the two results.

The meter has already done this, however, after a fashion, by omitting one and doubling the other, and the question would be whether the meter or the pencil pusher had the better answer.

Personally, I would bet on the meter!

Recommendations for pole reuse cover inspection and treatment

◆ REMOVAL of a large number of sound transmission poles is made necessary each year by changes in highway construction, increases in line voltage, need for taller or stronger poles for altered operating conditions, and many other reasons.

This problem has recently been discussed in a report issued by the Transmission and Distribution Committee of the Edison Electric Institute.

Experience throughout the industry shows that the life expectancy of a pole is decreased when it is removed and reset in another place or when its ground line level is changed without additional preservative steps.

Economic, engineering, and safety considerations require careful selection of poles for reuse. In addition it must be economically justifiable to use additional preservative if a pole is selected for reuse.

Inspection procedures

Inspection is of paramount importance in the selection of poles for reuse. Used poles should normally be accumulated at suitable storage points for inspection. When long sections of line are removed it may be more practical to inspect the poles at the removal location. Inspection sites should allow sufficient space for manipulation of poles to allow complete visual and manual inspection of each piece.

Inspection sites should have space to segregate inspected poles into several categories: newer poles requiring soil poisoning or groundline treatment only; poles requiring retreatment at a commercial treating yard; poles requiring treatment by company personnel; poles requiring turning or shaving to remove decayed sapwood; and poles unsuitable for reuse.

Inspection can be accomplished with fixed or mobile pole handling equipment, or with manual labor. Poles should be visually and manually inspected for suitability under current specifications to consider the extent of the following defects: decay internal or external at or below the groundline; decay internal or external above the groundline; splits, excessive weather checking, and cross breaks; compression wood; gaff marks; and other deteriorating defects such as woodpecker damage.

Poles should be rejected for reuse if they cannot be turned and cut back or reclassified to a usable diameter and length, after removing the decayed or damaged section. They should also be rejected if internal decay will be present after cut back, if more than superficial sapwood decay will be present after cut back and turning, if compression wood will be present more than one eighth inch deep or more than three feet in diameter after cut back and turning, or if they have an excessive number of gaff marks.

Poles should be marked to show the new proposed class and length after cut back, the date of the original treatment, and what disposition is to be made of the pole.

A report of inspection should show by class and length the num-

ber of poles to be retreated, to be scrapped, and which have been cut back, giving new length and class or dimensions of stubs and extensions.

Pole treatment

Soil poisoning or groundline treatment should be applied when poles are reset without other retreatment. Creosote or other fungicide and insecticide may be used for soil poisoning. The top foot of backfill should be thoroughly saturated with the poisoning agent. Groundline treatment, employing commercially prepared products, should be applied in accordance with the manufacturer's specifications.

Retreatment at a commercial treating plant should include removal of excess dirt and, in the case of butt-treated cedar, turning or shaving (preferably by machine) above the groundline only. It is permissible to remove all of the above ground sapwood of a cedar to eliminate sapwood decay. No turning or shaving should be permitted below the groundline on cedar because the thin sapwood (average five-eighths inch depth) acts as a reservoir necessary to effective retreatment. Larch, fir, lodgepole pine, and other thin sapwood species should not be turned or shaved either above or below the groundline.

This retreatment should also include reframing and boring when necessary, and branding to show original and retreatment dates, amount and type of retreatment, and new size and class. To facilitate re-classing of turned or shaved cedar poles, the inspector

(Continued on page 104)

Groundline treatment data on standing poles

◆ A RECENT REPORT covering groundline inspection and treatment of creosoted pine poles in Texas shows that 30.7 per cent of 1,182 poles installed during a 24-year period had experienced decay. Of these 363 poles, 261 were rejected and the remaining 102 were left in service after the decayed portions were removed.

The report, which covers poles of Houston Lighting and Power Co., concerns Southern pine poles purchased to eight-pound or better retention specifications. The accompanying tabulation includes detailed results on the groundline inspection and treatment program.

Median age 31 years

Median average age of the poles in the summary is 31 years and the decay rate is considerably higher than the 21-year old (average) poles of the same type described in a 50,000 pine pole sample of July, 1959, made by Osmose Wood Preserving Co., Buffalo, N. Y.

According to Houston Lighting and Power, the poles concerned were located in wet-dry conditions which would be conducive to decay. According to Osmose Wood, however, quite a few poles on the line studied were replaced because of ground line decay prior to the inspection and do not show up on the summary.

A total of 1182 poles were inspected, of which 921 were treated and 261 rejected. The poles were installed from 1924 to 1948.

YEAR	TOTAL NO. OF POLES INSPECTED	POLES REJECTED			CIRCUMFERENCE REDUCED, OSMOSE TREATED			TOTAL POLES REJECTED OR DECAYED	
		Interior Decay (More than 1" from surface)	Outer Decay (1" or less from surface)	% To Total	Interior Decay (More than 1" from surface)	Outer Decay (1" or less from surface)	% To Total	No.	% To Total
1924	1	–	1	100.0	–	–	–	1	100.0
1925	52	2	16	34.6	–	10	19.2	28	53.8
1926	77	6	38	57.1	–	8	10.4	52	67.5
1927	63	4	3	11.1	–	7	11.1	14	22.2
1928	35	1	6	20.0	–	5	14.3	12	34.3
1929	763	11	131	18.6	–	58	7.6	200	26.2
1930	8	–	4	50.0	–	–	–	4	50.0
1932	9	–	–	–	–	–	–	–	–
1933	1	–	–	–	–	–	–	–	–
1934	8	1	1	25.0	–	–	–	2	25.0
1935	3	1	1	66.7	–	–	–	2	66.7
1936	8	1	2	37.5	–	1	12.5	4	50.0
1937	4	–	1	25.0	–	2	50.0	3	75.0
1938	1	–	–	–	–	–	–	–	–
1939	7	–	3	42.9	–	1	14.3	4	57.1
1940	2	–	1	50.0	–	–	–	1	50.0
1941	6	–	2	33.3	–	3	50.0	5	83.3
1942	19	–	3	15.8	–	–	–	3	15.8
1943	9	–	3	33.3	–	1	11.1	4	44.4
1944	3	–	–	–	–	–	–	–	–
1945	16	1	3	25.0	–	1	6.3	5	31.3
1946	36	1	10	30.6	–	1	2.8	12	33.3
1947	19	–	1	5.3	–	2	10.5	3	15.8
1948	32	–	2	6.3	–	2	6.3	4	12.5
TOTAL	1182	29	232	22.1	–	102	8.6	363	30.7

Above figures do not include 47 rejects caused by above ground defects.

Data on groundline inspection and treatment of standing poles (Houston Lighting and Power Co.).

New utility equipment

Conductor stringing blocks

The new 73-A series of conductor stringing blocks, manufactured by Sherman and Reilly, Inc., First and Broad Streets, Chattanooga, Tenn., features a strong but light aluminum alloy frame and an extra large throat.

This block is particularly useful for reconductoring when the old conductor is used as a pulling line. The

wide, flaring throat allows easy passage of splices, compression sleeves, and swivels, without danger of fouling.

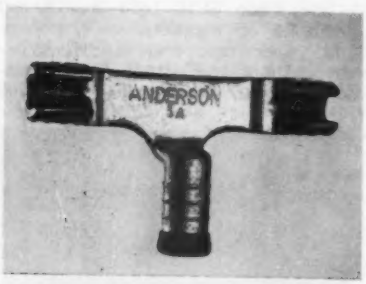
The block frame and sheave are structurally designed for extreme loads encountered in tension stringing, yet offer a block that is light and easy to handle. Exclusive safety locking head pin eliminates accidental opening. Built-in handles are an integral part of the side frames.

Write U-1201 on reply card, pg. 17

Anderson tee tap connector

Anderson Electric Corp., P. O. Drawer 2151, Birmingham, Ala., has placed on the market a new compression tee tap connector.

Designated type DCT, this new cable to cable connector is easy to



install since a wide selection of tools and dies is available. In addition, for hot line work there is a side open main.

The tap in the new DCT connector can be compressed with the same die that is used to compress the main. The main and tap grooves are preinhibited at the factory.

A decided advantage of the new tap conductor is the wide separation of the tap and main, which provides for maximum protection in making bi-metallic joints. The contact length of the main provides the ultimate in a good connection.

Write U-1202 on reply card, pg. 17

Sangamo transformer

Development of a new potential transformer, the type T-6, has been announced by Sangamo Electric Co., Springfield, Ill.

It is of the 600-volt insulation class for indoor-outdoor metering application. The accuracy classification is 0.3 for W and X burdens, but in addition the design allows 0.3 accuracy for burdens of two watthour meters, phase-shifting transformer, and demand register (approximately 35-volt amperes).

Impulse level is well in excess of ten-kv full wave. Thermal burden rating and supplemental rating is 500-volt-amperes at 30 C ambient.

The T-6 transformer is encapsulated in a colored epoxy resin and

mounted on a heavy aluminum base plate. Color coding for standard ratios is as follows: 2:1, red; 2. 5:1, yellow; 4:1, blue; and 5:1, gray. Solderless connectors are provided for both primary and secondary terminals which are located on opposite ends of the transformer.

Write U-1203 on reply card, pg. 17

L-M capacitor unit

New 50-kvar capacitor units for all 60-cycle voltages from 2,400 to 13,800 volts, which are 15 per cent lighter, are available from Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis. Now four inches wide

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ARMOR RODS . . .
Protect long-span T&D lines at supports

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Protect short-span T&D lines at supports

PATCH RODS . . .
Repair damaged conductors

TAP ARMOR . . .
Protects conductor at tapping points

FANNGRIPS . . .
For dead-ending strands and conductors

FANNSPLICES . . .
Join two ends of conductor wire

PLASTIC PRODUCTS . . .
For conductor surface protection

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PATCH RODS... Repair damaged conductors

TAP ARMOR... Protects conductor at tapping points

FANNGRIPS... For dead-ending strands and conductors

FANNSPLICES... Join two ends of conductor wire

PLASTIC PRODUCTS... For conductor surface protection

FANNER
The Fanner Manufacturing Co.
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and with maximum height of 33½ inches, these units retain the standard mounting dimension of 15⅝ inches for mounting in existing racks and blocks.

They incorporate cooling features to maintain low internal operating temperatures for extended service life.

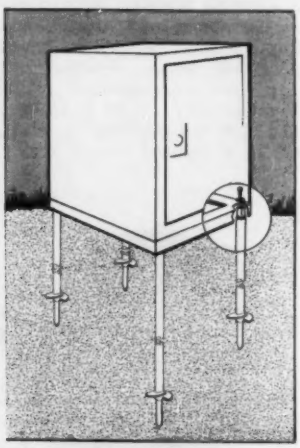
L-M's new units have been designed to meet all applicable NEMA standards for the performance and testing of shunt capacitors rated 2,400 to 7,960 volts. They are impregnated with low-temperature Elemex suitable for operation from —40 C to +46 C.

Stainless steel tanks, with solder-sealed bushings, have a primer and an alkyd resin paint finish for good heat dissipation.

Write U-1204 on reply card, pg. 17

Transformer foundation anchor

The A. B. Chance Co., 210 N. Allen St., Centralia, Mo., has designed an anchor that takes the place of concrete pads when mounting distribution transformers in subdivisions. The foundation anchor is installed verti-



cally to support the transformer.

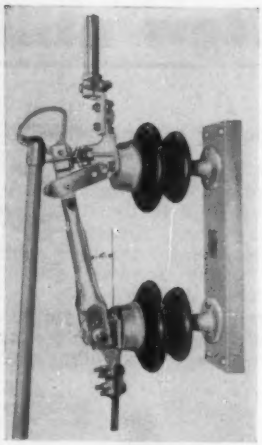
Four anchors are installed by two men using a special hand wrench and the complete installation, from start to energized lines, takes less than a day. The anchors have a threaded end which bolts either to a bracket made of angle iron or special mounting brackets on the base of the transformer.

Write U-1205 on reply card, pg. 17

Delta-Star hookstick switch

Simplicity of construction and unique operating features are presented in a new type B-2L line of outdoor hookstick disconnect switches of H. K. Porter Co., Inc., Delta-Star Electric division, 2437 Fulton St., Chicago 12, Ill.

Among new features are a ten-degree blade angle in closed position, fewer current interchanges, new hook



ring shape to self-seat the hookstick prong at a point of greatest mechanical advantage, integral pryout device and combination lateral blade latching, and positive operation under ice or corrosion conditions.

For a given angle between hookstick and blade, the operator can stand closer to the structure, an advantage in confined areas. The B-2L offers a blade angle partially equivalent to the angular underhung mounting of conventional disconnects.

Ratings are 7.2 kv thru 69 kv, 600 and 1,200 amperes. The new line also includes B-2L, double throw, and B-22L tandem throw switches.

Write U-1206 on reply card, pg. 17

IBM engineering computer

International Business Machines Corp., 112 East Post Rd., White Plains, N. Y., announced recently that the 1620 data processing system, designed for scientific use, can now turn its high-speed mathematical abilities to solving technical business problems as well.

Chief among the new optional features which extend the capabilities of the compact, transistorized machine are a tripled memory capacity plus punched card input and output. Both features can be installed on a basic 1620 system in a customer's office in one day.

The basic IBM 1620 has 20,000 positions of magnetic core storage and paper tape and electric typewriter input and output. An expanded 1620 can have 40,000 or 60,000

positions of magnetic core memory, together with punched card input and output. Other new features include both indirect addressing and direct division, which cut processing time and save programming steps.

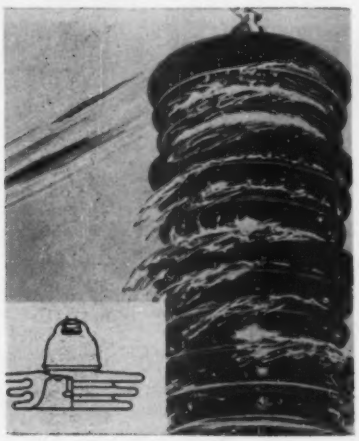
The 1620 is a variable word length system. This means that data stored in its memory will occupy only as many positions of core storage as there are digits in a number or characters in a word. In a fixed word length system, a block of memory space is set aside for every number or word, regardless of length. Thus, the 1620 memory is the equivalent of substantially larger memories in fixed word length computers. It is able to make more than 100,000 calculations a minute.

Write U-1207 on reply card, pg. 17

Delta-Star insulator

A new fog type insulator, with 50 per cent greater leakage distance than conventional units, is available from the Delta-Star Electric Division, H. K. Porter Co., Inc., Chicago, Ill.

The new insulator is for use where heavy fog or industrial contamination presents a serious maintenance problem. Moreover, it offers a substan-



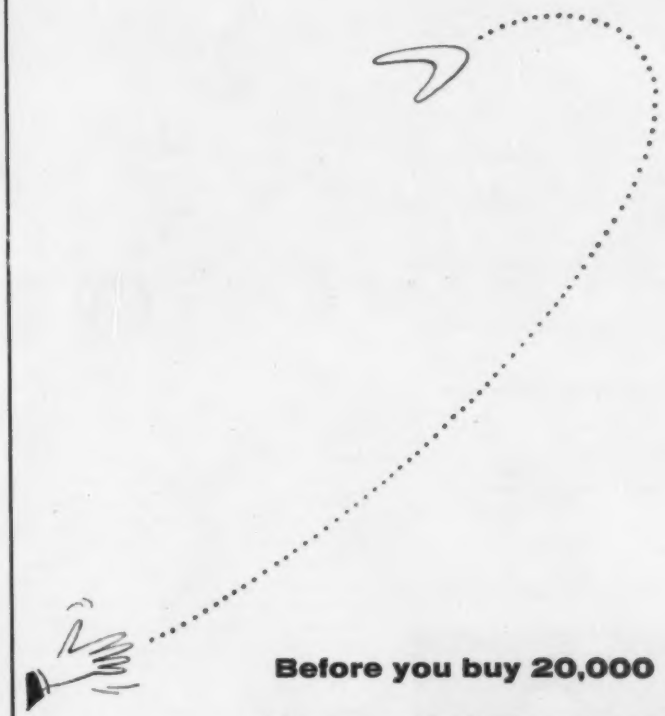
tially improved ability to prevent flashovers than other designs.

The unit's unique contours and undercut in discs, or "petticoats," minimizes the possibility of surrounding dense fog forming an easy, unbroken path of conductivity between line and post. The design also permits fast and easy cleaning by squirting water from one side only; the shape of the petticoats causes the water to swirl completely around the unit.

Write U-1208 on reply card, pg. 17

Unbreakable light globe

Recent announcement of unbreakable pendant-type street light globes has resulted in heavy demands for a fiberglass globe of the upright



Before you buy 20,000 "throw-away" photocontrols because they're inexpensive, consider:

did you ever try to throw away a boomerang?

If you can't afford to replace a few thousand poorly-made photocontrols when they fail two or three years after installation, you can't afford the "savings" of their low first price. The Fisher-Pierce Co., 59 Pearl St., So. Braintree 85, Mass.

FP

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type. After additional research and development, Plastic Age Manufacturing Co., 14300 Davenport Rd., Mint Canyon, Calif., has produced such a globe.

These new unbreakable globes will offer the ideal solution to vandalism and accidental breakage. Made of a special modified polyester resin, reinforced with chopped fiberglass, the new globes will withstand, without penetration, bb's, pellets, and heavy rocks propelled from a distance of less than six feet.

Rifle bullets will penetrate the globe, but the glass fibers tend to reseal the opening and prevent entry by insects.

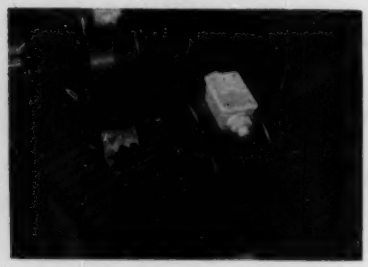
Light transmission qualities are excellent and the globes are not affected by temperatures in the range of —20 F to 350 F. Ultraviolet and weatherometer tests indicated a three- to five-year life.

Write U-1209 on reply card, pg. 17

A-C heavy-duty transformer

Now in production at the Pittsburgh works of Allis-Chalmers, Milwaukee 1, Wis., is a new epoxy-porcelain, window-type, heavy-duty high-current metering transformer (type BKAW-M).

Available in the 5-kv, 8.7-kv, and 15-kv insulation classes in current ratings 1,000 through 4,000 amperes,



the new transformer combines the outstanding characteristics of epoxy-resin and creep-flashover characteristics of porcelain.

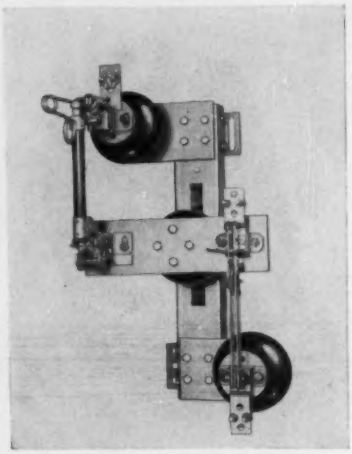
Toroidal windings on a continuously wound core are encapsulated in epoxy resin which serves as insulation, support, and case for the transformer element. The porcelain sleeve in the new transformer provides the insulation for the primary conductor.

The new transformer can be installed in any position. It is impervious to acid and salt atmospheres, requires no maintenance or painting, and has excellent dielectric properties.

Write U-1210 on reply card, pg. 17

L-M power fuse tandems

New switch and power fuse tandems, produced by Line Material Industries, 700 W. Michigan St., Milwaukee 1, Wis., offer excellent fault protection when used to bypass oil circuit reclosers or breakers. These combinations, available in nominal voltage ratings of 7.2, 14.4, and 23 kv and maximum interrupting ratings of 20,000, 16,000, and 9,000 amperes,



respectively, can be applied on systems up to 14.4/24.9-kv grounded wye.

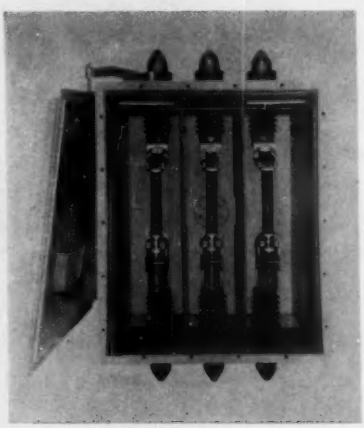
Three basic designs, including type HDO fuses or HXO power fuses in tandem with type DP switches, and HXO power fuses in tandem with PES power switches, are manufactured with left- and right-hand offset arrangements to meet various structural clearance requirements. These combinations can be mounted in substations or on poles.

Features of L-M tandems are full range fault-clearing ability, corrosion-resistant components, universal mounting base, and large clamp-type terminals.

Write U-1211 on reply card, pg. 17

S&C metal-clad enclosures

New submersible metal-clad enclosures for power fuses have been announced by S&C Electric Co., 4435 North Ravenswood, Chicago 40, Ill. The enclosures, rated 13.8 kv and 95 kv BIL, are available off-the-shelf in two basic designs.



One design has a hinge-type door and accommodates S&C's solid-material boric-acid power fuse type SM-5C. These fuses have interrupting capacity of 500 mva, symmetrical, at 13.8 kv and a continuous rating of 400E amperes.

The second design, intended for confined areas (mainly underground vaults), has a suspension-type door to minimize front and side clearances. This enclosure accommodates S&C's solid-material boric-acid power fuses types SM-4B (200E amps, continuous) and SM-5B (400E amps, continuous). The SM-5B has an interrupting capacity of 450 mva, symmetrical, at 13.8 kv.

Write U-1212 on reply card, pg. 17

Photoelectric adapters

Two new meter socket adapters, the WTA 120 and the 120R, are now available from the Tabet Manufacturing Co., 1336 Ballentine Blvd., Norfolk 12, Va.

Both adapter designs permit replacement of the older group photoelectric control by the smaller control presently used primarily for in-

dividual lamps. The WTA 120R is complete with a 30-ampere relay for heavy loads, and the WTA 120 is furnished without relay and is intended for smaller loads that can be handled by the self-contained relay in the photoelectric control.

No rewiring is necessary to take advantage of standardization on one photoelectric control by the use of these adapters. They are simply plugged into the existing meter socket base.

Write U-1213 on reply card, pg. 17

Lightweight power capacitors

Two newly designed lightweight power capacitors are thoroughly tested and ready to market by Sangamo Electric Co., Springfield, Ill. Sangamo design and improved kraft paper dielectric has brought about a substantial weight reduction in their 50-kvar unit. The same design advantages have resulted in a 100-kvar capacitor that is one of the smallest

WESTINGHOUSE POWERCASTING* helps Baltimore Gas and Electric build nation's first underground 240/480-volt residential distribution system

Stately Kingswood by-the-Severn is provided out-of-sight service at an installed cost competitive with overhead system

Five years of intensive studies at Westinghouse have helped make it possible for Baltimore Gas and Electric Co. to pioneer in servicing Kingswood with 240/480-volt underground distribution. *Although still in the early construction stages,* this project indicates an equipment investment and installation cost comparable with 120/240-volt overhead systems. Westinghouse is supplying transformers and meters, and a full complement of major appliances specially designed for 240-volt service.

Total Electric Living . . . a critical challenge to distribution investment dollars

The average home today consumes 3500 kilowatthours of electricity annually. In 10 years, average usage will rise to 10,000 kilowatthours.

Spending for distribution equipment alone is now at a rate of well over one and a half billion dollars annually. In 1969, this area of expenditures for expansion and modernization will virtually equal total electric utility system spending today. On the back of every dollar invested by each utility in distribution equipment today rides an implicit answer to many questions. Is this equipment contributing to system reliability? Can voltage be maintained at acceptable levels? Will this system be economical for load densities triple and quadruple those of today? Are the system design principles this equipment represents those that will be modern 10 years from now?

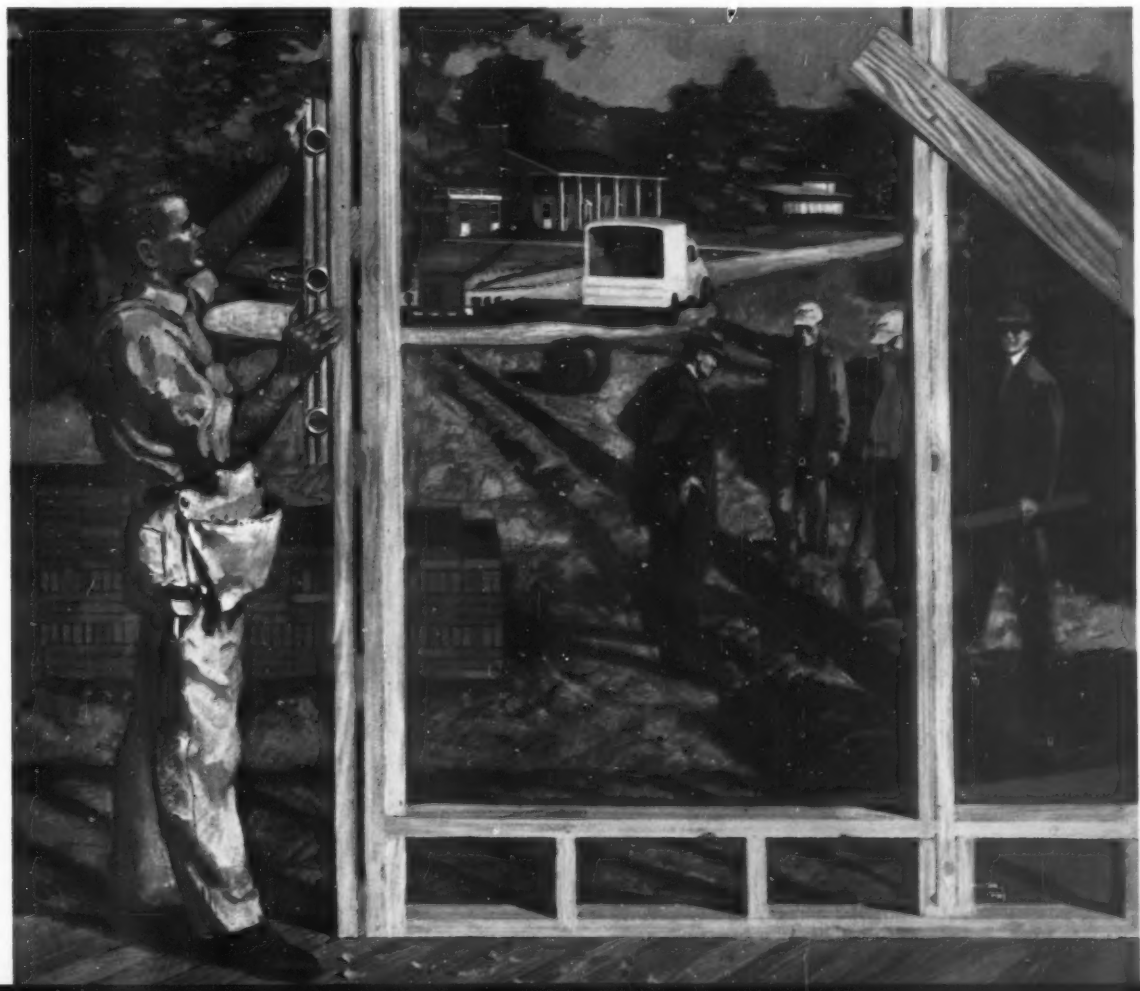
On the following pages, read how Westinghouse Powercasting has helped one utility answer these and other questions . . . with a completely modern system at Kingswood.

Presently planned for 72 Total Electric Homes, Kingswood, Maryland, will eventually accommodate 500. Heavily wooded, gently rolling acres descend to the Severn River where a fully equipped yacht club serves the community. A country club, golf course, swimming pools and other facilities fulfill a concept of estate living.

You can be sure . . . if it's Westinghouse.

*A Service-Mark of Westinghouse

Westinghouse



WESTINGHOUSE POWERCASTING*

with utility-developer cooperation makes possible massive demonstration

The custom-designed Total Electric Homes in Kingswood, Maryland, will be served electrically by the country's most unique distribution system . . . a direct burial 240/480-volt secondary system. For the first time anywhere, an entire new community will enjoy the benefits of an underground power supply . . . with 240/480-volt secondary service.

BG&E capitalizes on previous successful experience with buried power cable installations

Primary voltage at Kingswood is 13 kv. Primary and secondary cables will be directly buried in the earth. The utility decided that coverings such as concrete or creosoted planks are not necessary. Because of predicted high cable reliability, a radial system was selected.

Distribution transformers are Westinghouse single-phase 167 and 250 kva, pad-mounted type, set on a concrete mat. Permissible loadings are 160% of nameplate in winter, 120% in summer. Steady-state voltage drop from transformer secondary terminals to meter, and maximum voltage dip, are set at 4%.

Comparative system cost estimates prove out higher voltage plans

Overhead 120/240-volt and underground 240/480-volt systems were designed and field layouts prepared by the utility. Costs included 13 kv primary, transformers, secondary, services, metering and dry-type 240/120-volt autotransformers. The developer will bear the cost of excavating trenches, installing conduit under paved areas, and will build transformer foundations. Total investment costs to the utility for the *higher* voltage underground system are expected to be comparable with those for a conventional overhead 120/240-volt system.

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# of Total Electric Living concept and the economies of HSV distribution

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Developer, architect select Westinghouse to supply special 240-volt major appliances

Each Kingswood home is to be served by a 3-wire, 240/480-volt system. The meter is a Westinghouse 480-volt, 3-wire device. A Westinghouse autotransformer on the load side of the meter supplies 120-volt service to Westinghouse refrigerator, food waste disposer, other small appliances and centrally controlled lighting. The Westinghouse DSL load survey recorder will be installed as part of a joint BG&E-Westinghouse study of loads and load characteristics for future system analysis.

The developer of Kingswood, J. W. McCrocklin, and his architect, D. J. Olivola, selected Westinghouse to design and furnish heat pumps and major appliances suitable for 240-volt operation . . . de luxe broiler oven and platform range, built-in dryer, quick-recovery water heater, dishwasher. Appliance changes involved redesign of some components, and grounding of metal frames to noncurrent-carrying ground wire, separate from the electrical system, to insure safety.

Westinghouse heat pump brings modern air-comfort system to Kingswood

The largest single load device at Kingswood is the Westinghouse heat pump . . . a self-contained, air-to-air unit. Two 2½-hp compressors, two ½-hp condenser fan motors, one ¾-hp evaporator fan motor and 18 kw of supplementary resistance heating comprise this equipment. Based on an outdoor temperature of 0° and a structure heat loss of 75,000 Btu per hour, maximum half-hour demand will be 23.5 kw. In each home, maximum 30-minute load is 28 kw.

*A Service-Mark of Westinghouse

Westinghouse

WESTINGHOUSE POWERCASTING* is ready today to help you apply higher secondary voltages to a new residential area

Westinghouse proposes that you start today applying the principles of Total Electric Living served completely by an underground higher secondary voltage system to a new community

Westinghouse will:

1. Help you determine the precise distribution voltage level appropriate to your total system.
2. Help you engineer and select all distribution apparatus for this new system.
3. Negotiate all *higher* voltage appliances to be used in these homes.
4. Work with you and the developer-contractor to make this new residential area an outstanding example of Total Electric Living.

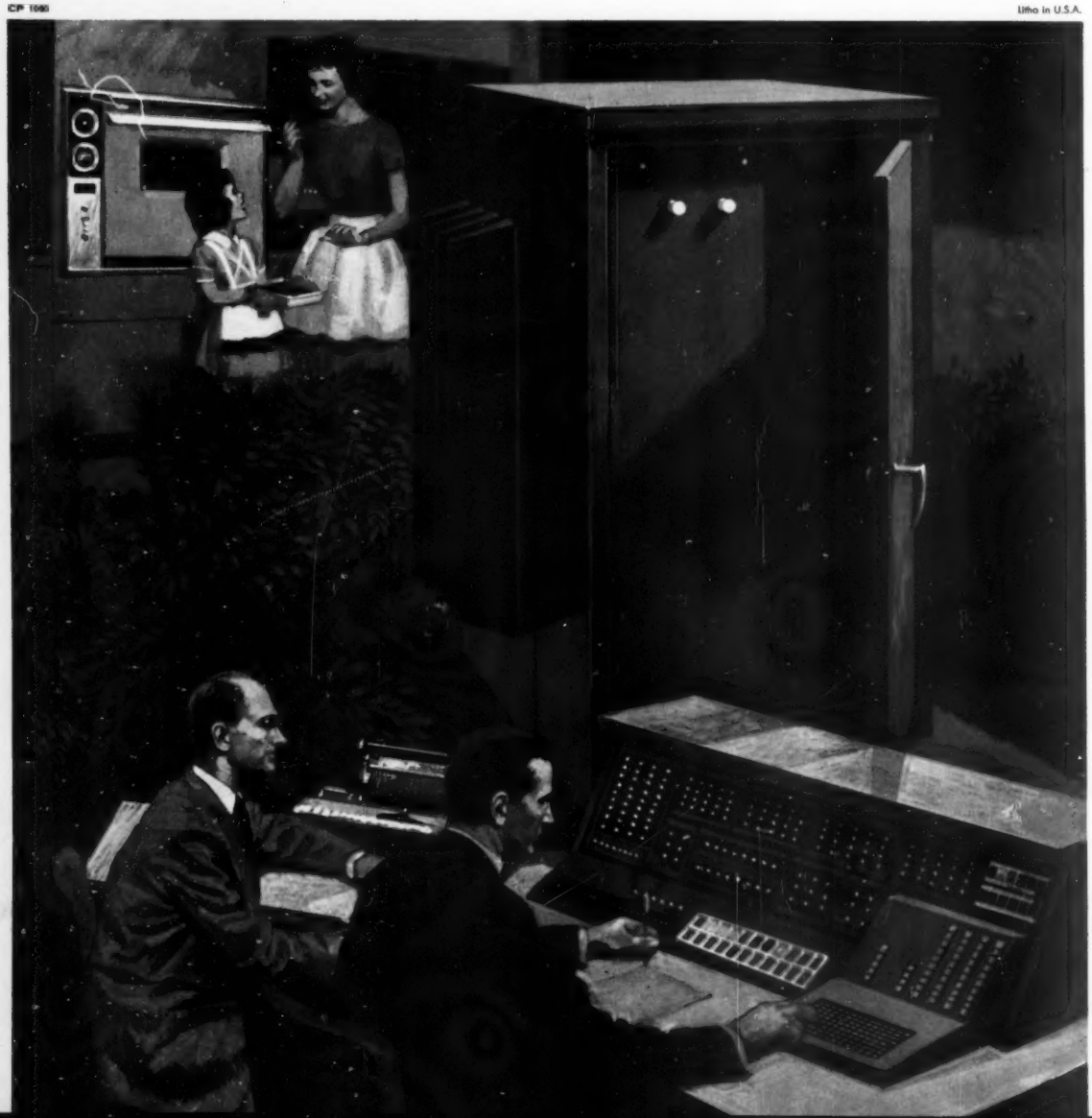
Call your Westinghouse sales representative today . . . ask for Powercasting service

*A Service-Mark of Westinghouse

Westinghouse

CP 1060

Litho in U.S.A.



and lightest on the market.

Weight reductions of 18 and 25 per cent have been achieved in the 5- and 8.67-kv 50-kvar capacitors. New low-loss kraft paper dielectric combined with Sangamo Diaclor has produced a unit with 15 per cent lower watt losses over an extended temperature range.

Case dimensions of the five-kv unit are 4⅛ inches wide by 13½ inches long by 23⅛ inches high. This narrow 4⅛-inch case design provides maximum internal heat dissipation for long life and dependability. Stainless steel cases are standard. Mounting dimensions remain at the NEMA standard of 15⅝".

Write U-1214 on reply card, pg. 17

Meter socket load center

Three new aluminum enclosed meter socket—load center combinations are now available from the Circuit Protective Devices Dept., General Electric Co., 41 Woodford Ave., Plainville, Conn.

Providing space for six 240-volt, two-pole circuits, the new combination units offer the convenience of a

meter socket and a circuit breaker load center within the same enclosure.

Three ratings are available—100 amperes (cat. No. TRPA1210MPR4), 150 amperes (cat. No. TRPA1215-MPR4), and 200 amperes (cat. No. TRPA1220MPR4). All have surface-mounted raintight enclosures and are single-phase, three-wire devices designed for installation on 120/240 volt a-c systems. Insulated groundable neutrals are standard. The new units are listed by Underwriters' Laboratories as non-interchangeable Class NI service entrance equipment.

Write U-1215 on reply card, pg. 17

Lapp suspension insulator

Lapp Insulator Co., Inc., Le Roy, N. Y., has a new, special purpose fog type suspension insulator designed for use in areas of heavy contamination where natural cleaning is inadequate and artificial cleaning must be resorted to.

Identified as "California" fog type suspensions, the new units are rated at 15,000 pounds, M&E strength, and are available for ball-socket or clevis-eye mounting in 5¾" and 6½" spacing units.

The new triple petticoat design provides 18" of leakage distance, the same as Lapp's standard fog type suspensions. The deep-cut gently curved corrugations catch the wash water and swirl it around the insulator, flushing and cleaning the entire surface.

Write U-1216 on reply card, pg. 17

Alcoa hot line tool

A new hydraulic hot line tool, a non-lethal aid for electric power linemen, is available from Aluminum Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

This device safely applies the labor-saving convenience of hydraulic power for work on live high voltage lines.

The seven-foot, ten-inch long tool requires no special equipment. It can be operated from any 10,000 psi foot or motor-driven power pump equipped with standard hoses, and now used for field work.

A swivel head, positioned at a 45-degree angle on the shaft of the new hot stick, enables a lineman to work from the safest possible position while providing him an unobstructed view of the dies at all times.

Design of the unique Alcoa tool prevents fluid contact between tool and pump, thereby eliminating accidents resulting from use of improper or contaminated oil.

Write U-1217 on reply card, pg. 17

Cable accessory kit

Epoxylite Corp., 1428 North Tyler Ave., South El Monte, Calif., is manufacturing a cable accessory kit #735 for making hermetic oil-seals in pothead terminations for paper lead cable operating in the 23-35-kv range.

Advantages of the hermetic seal are twofold: simplified installation and reduced maintenance costs.

The cable is prepared in the normal manner, with construction of

ANNOUNCING

PENGO-Prope

—the most satisfactory pulling line available today!

* GREAT STRENGTH
(9,600 lbs. tensile for ¾" diam.)

* LIGHT WEIGHT
(11.7 lbs. per 100 ft., ¾" diam.)

* HANDLES AND SPLICES LIKE MANILA
in any climate or weather.

* WATERPROOF,
(even salt water) can't mildew; excellent dielectric properties.

PENGO-Prope is a synthetic rope of special construction for pulling line use. Although PENGO has other synthetic and manila pulling lines, we believe PENGO-Prope far surpasses these ropes in cost-saving performance.

PENGO-Miller
LINE STRINGING SWIVELS

Special models of the well-known MILLER swivels redesigned specifically for tension line stringing use.

The result is a reliable, heavy duty swivel of proper dimensions to pass through stringing sheaves and bullwheel grooves easily, without damage.

Dept. 33

PETERSEN ENGINEERING CO., INC.
Santa Clara, California
Phone: AXminster 6-7712

B-10

conventional stress cone. Over this, a laminate of special epoxy resin and orlon tape is constructed by a simple, brush-on-and-warp technique. Laminate extends from the lead sheath to the terminal ferrule, providing a positive oil and moisture-tight hermetic seal.

After construction of the epoxy-orlon laminate, the pothead is applied and is substantially filled with oil, leaving a small space for expansion and contraction. No exterior oil reservoir is required.

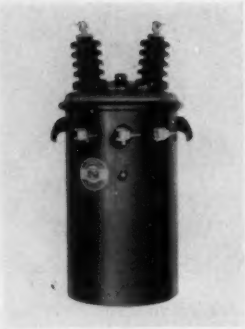
Hermetic seals constructed in the above manner have been subjected to over-voltage tests to establish a life expectancy in excess of 100 years.

Write U-1218 on reply card, pg. 17

Moloney transformers

Moloney Electric Co., St. Louis 20, Mo., has a new line of pole-mounted distribution transformers. The new design is presently available through 100-kva and will soon be available in all sizes of the distribution transformer line.

External mechanical features of the new transformer line include a deep-drawn, crowned cover which, on transformers with cover-mounted bushings, combines with the plastic coating to afford maximum protection outages caused by wildlife; a



captive center-bolt hand-hole closure; reduction in cover hardware through use of a single captive stainless steel bolt which engages a cover clamping band; weep-holes in the clamping band to prevent water being trapped by the band; a steel shipping band binding the transformer to its shipping pallet; a strong wire-bound, wood-slat protective shipping enclosure; and rounded lifting hooks to minimize rope or cable sling abrasion.

Internal features of the new transformer line include a top rim rolled more than 400 degrees for greater strength against distortion; a welded positioning and grounding means for transformers with insulated covers, to prevent shock hazards and radio frequency interference; a new high strength frame for greater short-circuit withstand; and a three-point suspended core-and-coil assembly, to reduce the sound level through elimination of a "drumhead" effect.

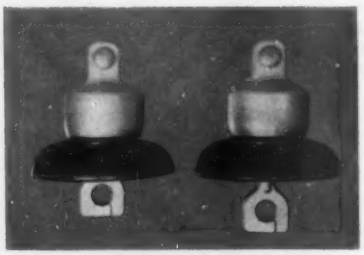
Write U-1219 on reply card, pg. 17

Chance suspension insulator

The A. B. Chance Co., 210 N. Allen St., Centralia, Mo., is now manufacturing a six-inch suspension insulator with forged aluminum caps and studs. The aluminum hardware reduces the weight of the insulator 25 per cent below that of six-inch insulators with ferrous hardware.

The aluminum hardware insulators are made in two string lengths—5½ inch or 6¼ inch for ease in working "hot."

Write U-1220 on reply card, pg. 17



PMC FIELD PROVEN CONTROL

OVER 250,000 INSTALLATIONS!

A complete line of precision photoelectric controls & accessories for outdoor lighting.

PRECISION MULTIPLE CONTROLS., RIDGEWOOD, N. J.

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The editorial and business staff of ELECTRICAL SOUTH is eager to serve you. One way in which we can help you is to make it easy for you to draw upon the wealth of technical and promotional material available from manufacturers.

In the accompanying pages are the descriptions of scores of useful catalogs, application information booklets, and technical publications. These are available without charge.

Check over the list of publications available, indicate the numbers of the ones you want on the postage - paid card to be found on page 17, and mail it to us with your name, title, company and address plainly written. We will tell each manufacturer to send directly to you the information you want.

Know the law

by Arthur L. H. Street

Insurance against theft for contents of trucks

ELECTRICAL DEALERS and contractors should be interested in what the Louisiana Court of Appeal decided in a New Orleans case because the legal principle involved applies with equal force to insurance of the contents of delivery or service trucks of all kinds, under similar policy provisions.

While a serviceman left his truck unlocked in front of a building for about 15 minutes someone stole contents worth $1,100. The truck was covered by a policy that insured against loss of contents by theft or burglary "with visible evidence of forceful entry."

The court decided that suit to collect on the policy must be dismissed because there was no visible evidence of forceful entry, such as would have been evident had the truck door been locked. (Petrie v. Millers Mutual Fire Insurance Company of Texas, 115 So. 2d 228.)

Correct posting needed for mechanic's lien law

EVERY ELECTRICAL contractor and dealer in electrical equipment should be thoroughly posted as to what the mechanics' lien law of his state requires to be done in order to preserve a right to a lien against the property benefited by the work or equipment furnished.

The experience of a West Virginia lumber company should specifically interest West Virginia electrical supply dealers because it involved an interpretation of the lien law of that state. But, although the wording of laws in different states differs, the case should interest electrical dealers and contractors in all states as a warning that there should be rigid compliance with local statutory requirements concerning service and filing of lien claims.

Notice held void

The West Virginia Supreme Court of Appeals decided that a notice of a lien claim served on the owner of a building on account of materials furnished a building contractor was void because it failed to comply with statutory requirements. The court said:

"The notice served on the defendants did not contain the essential statutory requirements. It did not advise the property owners as to the dates, quantity, and prices of the materials furnished. Without this information, the property owners would have no way of ascertaining whether such materials furnished to the contractor were used in the building of the structures on their land. This is only true, of course, where materials are furnished to a contractor for the property owner. If the materials are furnished directly to the property owner, no such itemized account, showing the dates, quantity and prices, is required, because the property owner would have direct notice himself as to the materials furnished and used in the construction of his building and there is no need to even serve any notice of mechanic's lien on a property owner in such case.

Statute requirements

"The only requirement of the statute in such case, in order for a materialman to perfect a lien on the property, is that he shall cause to be recorded in the office of the clerk of the county court of the county wherein such property is located, within ninety days from the date when he shall have ceased to furnish such materials, a notice of such lien showing the sum claimed, with a description of the property." (Gray Lumber Co. v. Devore, 112 S.E. 2d 457.)

Defective wiring costly to electrical contractor

THE PROBLEM: An electrical contractor's crew wired a dwelling house. A month later the house was damaged by fire. The owner sued the contractor and was awarded $3,000 damages. Did the evidence justify the award?

COURT'S ANSWER: Yes. So decided the Oregon Supreme Court in the case of Brown v. Eakins, 348 Pac. 2d 1116. The Court said that the circumstances under which the fire originated, interpreted in the light of testimony of an electrical expert, justified a decision that the contractor's employees left an outlet box in defective condition. The condition of a terminal connection after the fire was an important factor.

The first question decided by the Supreme Court was whether one Blivin, a witness for plaintiffs, was qualified to testify as an electrical expert. Deciding that he was qualified, the Court said that Bliven had had 20 years of experience as an electrician. He worked for a contractor doing fire damage work and inspected jobs to make bids.

It was not his duty to determine the cause of fires, but he was sometimes called upon to determine what caused fires, and he has seen about 200 fire jobs. He has talked to the Fire Inspection Bureau on various installations as to what caused fires. His experience had been practical only, and he was not specifically trained for determining fire causes.

An employee of defendant who had worked on the outlet box when it was installed testified that in installing the box he stripped the insulation from the wiring with a knife, which he said was the ordinary method.

He stated that the job was installed according to "Code" and the material was "Underwriters-approved," but he did not know how many circuit breakers were installed.

He was shown a terminal connection but could not tell if it had been nicked or damaged because, as he stated: "It has been very hot. You can't tell." He found that the insulation had been burned from the wire leading from the outlet box. He inspected the job during the course of the work, but did not make a final inspection or render final approval of the job.

He found some electrical cables placed under the ceiling joists instead of being run through holes bored in the joists and ordered a change so as not to interfere with

(Continued on page 104)

New series of tables extended to include larger hourly rates

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

CONDUIT IN WOOD OFFICE BUILDINGS

THIN WALL

NEW WORK CONCEALED

COND. SIZE	HOURS "C"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75	$4.00	$4.25	$4.50
1/2"	7.0	.14	.158	.175	.193	.21	.228	.245	.263	.28	.298	.315
3/4"	7.5	.15	.169	.188	.206	.225	.244	.263	.281	.30	.319	.338
1"	8.9	.178	.20	.223	.245	.267	.289	.312	.334	.356	.378	.401
1 1/4"	11.9	.238	.268	.298	.327	.357	.387	.417	.446	.476	.51	.54
1 1/2"	14.0	.28	.315	.35	.385	.42	.455	.49	.53	.56	.60	.63
2"	19.3	.386	.434	.483	.53	.58	.63	.68	.72	.77	.82	.87
RIGID												
1/2"	7.4	.148	.167	.185	.204	.222	.241	.259	.278	.296	.315	.333
3/4"	8.0	.16	.18	.20	.22	.24	.26	.28	.30	.32	.34	.36
1"	9.3	.186	.209	.233	.256	.279	.302	.326	.349	.372	.395	.419
1 1/4"	12.6	.252	.284	.315	.347	.378	.41	.441	.473	.50	.54	.57
1 1/2"	14.8	.296	.333	.37	.407	.444	.481	.52	.56	.59	.63	.67
2"	20.3	.406	.457	.51	.56	.61	.66	.71	.76	.81	.86	.91
2 1/2"	23.5	.47	.53	.59	.65	.71	.76	.82	.88	.94	1.00	1.06
3"	34.0	.68	.77	.85	.94	1.02	1.11	1.19	1.28	1.36	1.45	1.53
4"	52.5	1.05	1.18	1.31	1.44	1.58	1.71	1.84	1.97	2.10	2.23	2.36

E-101-B

LABOR: INCLUDES HANDLING MATERIAL AT SITE, DRILLING OR NOTCHING ACCESS HOLES, BENDING AND OFFSETS, INSTALLING ANCHORS, CUTTING, THREADING AND REAMING AND INSTALLING CONDUIT AND ATTACHING AT TERMINUS.

12-60

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CONDUIT IN VERTICAL SHAFTS
THINWALL ON TILE

COND. SIZE	HOURS "C"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2"	4.2	.084	.095	.105	.116	.126	.137	.147	.158	.168	.179	.189
3/4"	4.6	.092	.104	.115	.127	.138	.15	.161	.173	.184	.196	.207
1 "	5.3	.106	.119	.133	.146	.159	.172	.185	.199	.212	.225	.239
1 1/4"	7.3	.146	.164	.183	.201	.219	.237	.256	.274	.292	.31	.329
1 1/2"	8.9	.178	.20	.223	.245	.267	.289	.312	.334	.356	.378	.401
2 "	11.4	.228	.257	.285	.314	.342	.371	.399	.428	.456	.485	.51
		RIGID ON TILE										
1/2"	5.5	.11	.124	.138	.151	.165	.179	.193	.206	.22	.234	.248
3/4"	6.0	.12	.135	.15	.165	.18	.195	.21	.225	.24	.255	.27
1 "	7.1	.142	.16	.178	.195	.213	.231	.249	.266	.284	.302	.32
1 1/4"	9.7	.194	.218	.243	.268	.291	.315	.34	.364	.388	.412	.437
1 1/2"	12.1	.242	.272	.303	.333	.363	.393	.424	.454	.484	.51	.54
2 "	15.3	.306	.344	.383	.421	.459	.497	.54	.57	.61	.65	.69
2 1/2"	19.4	.388	.437	.485	.53	.58	.63	.68	.73	.78	.82	.87
3 "	25.6	.51	.58	.64	.70	.77	.83	.90	.96	1.02	1.09	1.15
4 "	39.6	.79	.89	.99	1.09	1.19	1.29	1.39	1.49	1.58	1.68	1.79
5 "	65.5	1.31	1.47	1.64	1.80	1.97	2.13	2.29	2.46	2.62	2.78	2.95
6 "	92.5	1.85	2.08	2.31	2.54	2.78	3.01	3.24	3.47	3.70	3.93	4.16

E-102-B

LABOR: Includes handling material at site, drilling or notching access holes, bending and offsets, installing anchors, cutting, threading and reaming and installing conduit and attaching at terminus.

12-60

CONDUIT IN VERTICAL SHAFTS
THINWALL ON CONCRETE

COND. SIZE	HOURS "C"	LABOR COST INSTALLED PER FT. AT FOLLOWING RATES										
		2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
1/2"	5.4	.108	.122	.135	.149	.162	.176	.189	.203	.216	.23	.243
3/4"	5.8	.116	.131	.145	.16	.174	.189	.203	.218	.232	.247	.261
1 "	6.9	.138	.155	.173	.19	.207	.224	.242	.259	.276	.293	.311
1 1/4"	9.5	.19	.214	.238	.261	.285	.309	.333	.356	.38	.404	.428
1 1/2"	11.6	.232	.261	.29	.319	.348	.377	.406	.435	.464	.493	.52
2 "	14.9	.298	.335	.373	.41	.447	.484	.52	.56	.60	.63	.67
		RIGID ON CONCRETE										
1/2"	5.8	.116	.131	.145	.16	.174	.189	.203	.218	.232	.247	.261
3/4"	6.4	.128	.144	.16	.176	.192	.208	.224	.24	.256	.272	.288
1 "	7.4	.148	.167	.185	.204	.222	.241	.259	.278	.296	.315	.333
1 1/4"	10.2	.204	.23	.255	.281	.306	.332	.357	.383	.408	.434	.459
1 1/2"	12.7	.254	.286	.318	.349	.381	.413	.445	.476	.51	.54	.57
2 "	16.0	.32	.36	.40	.44	.48	.52	.56	.60	.64	.68	.72
2 1/2"	20.5	.41	.461	.51	.56	.62	.67	.72	.77	.82	.87	.92
3 "	26.9	.54	.61	.67	.74	.81	.87	.94	1.01	1.08	1.14	1.21
4 "	41.8	.84	.94	1.05	1.15	1.25	1.36	1.46	1.57	1.67	1.78	1.88
5 "	69.0	1.38	1.55	1.73	1.90	2.07	2.24	2.42	2.59	2.76	2.93	3.11
6 "	97.2	1.94	2.19	2.43	2.67	2.92	3.16	3.40	3.65	3.89	4.13	4.37

E-102-B

LABOR: Includes handling material at site, drilling or notching access holes, bending and offsets, installing anchors, cutting, threading and reaming and installing conduit and attaching at terminus.

12-60

Electrical Estimating—III

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Understanding the Code

By Walter R. Stone

This article should be especially helpful to the following readers:

- Electrical Contractors
- Electric Utilities
- Electrical Wholesalers
- Electrical Inspectors
- Industrial Engineers
- Consulting Engineers

◆ THE FIRST RULE of Article 445 of the Code governing generators states in Section 445-1, "Generators shall be located in dry places . . . " Of course, as stated in Section 90-2(b), the Code does not cover electric utilities in the exercise of their functions. However, the extensive and successful use by public utilities of outdoor generator installations in recent years indicates that a revision of this rule would not be amiss.

The section partially quoted above further states that generators shall be located " . . . also so as to meet the requirements of motors in Section 430-14 . . . " and provides that other special requirements shall be met such as when located in hazardous areas.

Since motors are not required to be located in dry locations where the motor enclosures are suitable for outdoor uses, and since Section 445-1 itself states that generators installed in hazardous locations shall meet the requirements for such locations, it is surprising that this section has not already been revised to permit generators to be installed in wet locations where suitable enclosures for such wet locations are used. Certainly if enclosures can be made safe for use in explosive atmospheres, enclosures suitable for wet locations would not be impossible.

A fine print note following this section recommends that waterproof covers be provided for use on generators in emergencies. Where installed in dry locations only, such emergencies could, presumably, arise from the operation of fire sprinkler systems, accidental breakage of piping, and abnormal conditions in areas adjacent to but not suitably cut off from dry generator locations.

A good many portable generators used for temporary light and power are already used out of doors, to say nothing of welding machine generators which are used extensively out of doors.

Section 445-2 requires each generator to be marked with " . . . the maker's name, the rating in kilowatts or kilovolt-amperes, the normal volts and amperes corresponding to the rating, and the revolutions per minute."

Section 445-4 specifies the mini-

Code test questions

1. The Code requires generators to be located in dry places regardless of the type of the generator enclosure. True or false?

2. Drip pans need not be provided for generators unless required by the Code enforcement authority. True or false?

3. Generators operating at 150 volts or less and driven by individual motors shall be considered as protected by the overcurrent devices protecting the motors if these devices will operate when the generators are delivering not more than 250 per cent of their full-load rated current. True or false?

4. 3-wire d-c generators may be protected from overcurrent by either a 2-pole, 2-coil circuit breaker or a 4-pole, 2-coil circuit breaker. True or false?

5. If a generator operates at a terminal voltage in excess of 50 volts to ground, the frame is required to be grounded. True or false?

6. Transformers and transformer vaults:
(a) shall be readily accessible to qualified persons only.
(b) shall not be readily accessible.
(c) have no specific requirements for accessibility.
Which is correct? a? b? c?

7. Potential transformers:
(a) are required to be protected by primary fuses.
(b) are recommended to be protected by primary fuses.
(c) are not covered by the provisions of Article 450 on transformers.
Which is correct? a? b? c?

8. Current transformers:
(a) are required to be protected by primary fuses.
(b) are recommended to be protected by primary fuses.
(c) are not covered by the provisions of Article 450 on transformers.
Which is correct? a? b? c?

9. The rules governing overcurrent protection for transformers:
(a) applies strictly to individual transformers, but not to a bank of transformers operating as a unit unless correction factors are applied.
(b) applies strictly to a bank of transformers operating as a unit, but not to individual transformers unless correction factors are applied.
(c) applies to either individual transformers or to a bank of transformers operating as a unit.
Which is correct? a? b? c?

10. Secondary ties provided with limiters shall have a switch at each end which when open will de-energize the associated tie conductors and limiters where the operating voltage exceeds:
(a) 50 volts to ground.
(b) 150 volts to ground.
(c) 300 volts to ground.
Which is correct? a? b? c?

Correct answers may be found at end of article on page 103.

mum requirements for overcurrent protection for generators without distinction as to whether the generators are in attended or unattended locations. Paragraph (a) of this section does distinguish, however, between a-c and d-c generators. It states, "Constant-potential generators, *except alternating-current generators and their exciters,* shall be protected from excessive current by circuit-breakers or fuses." (Italics added.)

No requirements or further mention is made in regard to the overcurrent protection of a-c generators except in Paragraph (c) in which motor driven generators of 65 volts or less, without regard to whether they are a-c or d-c, are said to be sufficiently protected by the motor overcurrent devices provided that such devices " . . . operate when the generators are delivering not more than 150 per cent of their full-load rated current." The minimum overcurrent protection for all other a-c generators is left entirely to the judgment of the local inspection authorities.

Fortunately, most a-c generators are either equipped by the manufacturer with suitable overcurrent devices, such as those used on portable units or on small stationary units, or else they are provided with suitable overcurrent protective devices by reason of design specifications, such as on large stationary units.

Although exciters are often operated without separate overcurrent protection in order to prevent the accidental opening of such a device from shutting down the main generator, it is basically unsound to omit from the generator itself overcurrent protective devices which are needed on the grounds that accidental opening or poor maintenance of complicated relaying devices may result in needless or embarrassing outages.

Regardless of how complicated the addition of overcurrent protective devices may make the control circuitry of a generator, if such devices are needed they should be installed not only for the protection of the generator itself, but also to prevent adverse effects on the connected system which might result from a serious or prolonged generator fault. Most large generators (1000 kva or larger) are protected by differential relaying with percentage-differential type relays predominating. (See the October, 1960, issue of ELECTRICAL SOUTH for a discussion and sketches of differential relays for large motor protection.)

Paragraph (b) of Section 445-4 permits the use of one overcurrent device instead of two in a 2-wire d-c generator if the " . . . device is actuated by the entire current generated, except that in the shunt field. The overcurrent device shall not open the shunt field." The opening of the shunt field of a generator would be a definite hazard by causing excessive voltage.

Paragraph (d) of this section requires overcurrent devices which will disconnect the 3-wire system from excessive unbalancing where balancers are used with a 2-wire d-c generator to obtain a neutral conductor. In such a case, a 2-pole circuit breaker with three operating coils would permit the breakers to operate when there is an overload in any one coil whether it be the coil in one of the armature leads or in the coil in the neutral lead. See Figure 1.

Paragraph (e) requires 3-wire d-c generators to be provided with an overcurrent device in each armature lead with a 2-pole or a 4-pole circuit breaker. In either case, there are two operating coils connected in the armature leads. In the case of the 4-pole breaker, two poles are connected in the armature leads and the other two in the

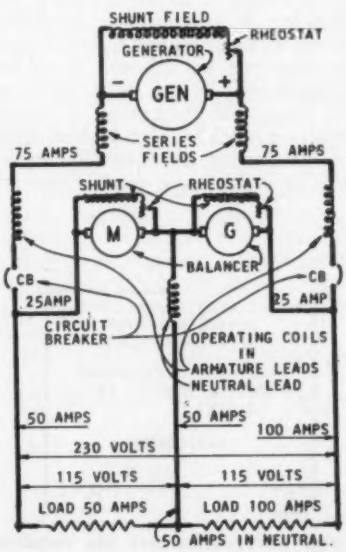


Fig. 1—This generator is properly protected with a two-pole circuit breaker having three operating coils, two in armature leads and one in neutral lead. In such an installation, when load is unbalanced, one unit of balancer acts as a motor and the other acts as a generator.

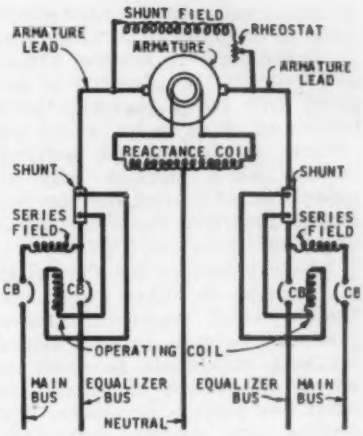


Fig. 2—Total armature current controls operating coils even though a current shunt is utilized because coil connection, with or without shunt, is ahead of point of division of current between main and equalizer busses.

equalizer leads. The breaker must be so interlocked that the opening of any one pole will simultaneously open all other poles.

In both Paragraphs (b) and (e), the overcurrent devices are required to be actuated by the *entire* current from the armature. This does *not* mean that shunts are prohibited. Shunts may be employed to carry the current with leads tapped off which carry a very small proportion of the total current and which operate the overcurrent devices in a manner similar to the operation of meters. What is meant by this statement is that the operating coil, with or without an accompanying shunt, must be so placed in the armature lead that all of the armature current passes through it and not at a point carrying only a part of the armature current. Where a generator is operated in parallel with other generators, equalizer busses are used, dividing the armature current between the armature lead and the equalizer lead. In such cases, the overcurrent operating coil, with or without a shunt, must be in the armature lead at a point ahead of this division of current. See Figure 2.

Section 445-5 requires generator conductors supplying connected loads to have a current-carrying capacity not less than 115 per cent of the generator nameplate current rating. Neutral conductors are required to be of the same size as the other two conductors.

Section 445-6 prohibits live parts of generators of more than 150 volts to ground to be exposed

to accidental contact where accessible to unqualified persons. This is amendatory of Section 110-16 which limits the potential of exposed live parts generally to a maximum of 50 volts where accessible to unqualified persons. Section 445-6 applies only to generators, of course, and does not amend, generally, the 50-volt maximum set by Section 110-16.

Where necessary for the safety of operators or other attendants, Section 445-7 requires insulated platforms or mats to be provided for such attendants to stand on where adjustment of brushes or other live parts is necessary. This section also requires hand-rails where needed to afford safe access to parts which must be adjusted during operation. These requirements are by reference to Section 430-133.

Generator grounding

Section 445-8 requires generator frames to be grounded or permanently and effectively insulated from ground if the terminal voltage exceeds 150 volts to ground. Although generator system grounding is not mentioned in Article 445, Section 250-4 requires the neutral of a 3-wire d-c system supplying interior wiring to be grounded. Section 250-3 requires 2-wire d-c systems supplying interior wiring to be grounded if the operating potential does not exceed 300 volts between conductors unless " . . . such system is used for supplying industrial equipment in limited areas and the circuit is equipped with a ground detector."

A fine print note following Section 250-3 recommends grounding 2-wire d-c systems where a neutral point can be established and where the maximum potential between this point and any other point on the system does not exceed 300 volts. If the potential between these points does exceed 300 volts, grounding is *not* recommended.

Section 250-22 states, "Direct-current systems which are to be grounded shall have the grounding connection made at one or more supply stations but not at individual services nor elsewhere on interior wiring."

Section 250-26 requires the point of grounding for isolated systems supplying interior wiring to be made at the generator or at the switchboard on the supply side of the first switch controlling the system.

Section 250-5 requires a-c systems, without regard to whether the supply is by means of a generator directly or through a transformer, to be grounded where the maximum voltage, after grounding, does not exceed 150 volts to ground. Grounding is recommended where the voltage to ground does not exceed 300 volts and is permitted for higher voltages. Section 250-23 requires the ground connection to " . . . be made on the supply side of the service disconnecting means . . . " with " . . . at least one additional connection to a grounding electrode at the transformer or elsewhere." This section requires such grounding for a-c systems " . . . at each individual service . . . "

Section 445-9 requires the soft rubber bushings which protect generator lead wires where they pass through the frame of the generator to be protected from " . . . oils, grease, oily vapors, or other substances having a deleterious effect on rubber."

The requirements for transformers and transformer vaults are covered in Article 450 of the Code. Section 450-2 requires both transformers and transformer vaults to be " . . . readily accessible to qualified personnel for inspection and maintenance."

Article 100 defines *readily accessible* as capable of being reached quickly without the need to climb over or remove obstacles or to resort to ladders, chairs, etc. Nothing is said in the definition about locks or locked doors. It may or may not be inferred from the requirement in the definition that it must be "capable of being reached quickly" that locked doors would render an object inaccessible, or at least not readily accessible. It also may be or it also may not be inferred that a lock is an obstacle which would have to be removed or in some way overcome and which therefore would render an object not readily accessible.

Locks generally acceptable

However, some means must be used to prevent such equipment from being accessible to *unqualified* personnel. For this purpose, locked doors serve very well. And although the *readily* accessible feature may be argued, locked areas are at least accessible to those with a key. Most inspectors much prefer the relatively minor delay imposed by locks on qualified persons to the possibility of unqualified persons being admitted where there are no locks.

In any case, Section 450-43(c) solves the issue insofar as vaults are concerned (and, of course, transformers which are located inside of vaults) by stating, "Entrance doors shall be equipped with locks, and doors shall be kept locked, access being allowed only to qualified persons. Locks and latches shall be so arranged that the door may be readily and quickly opened from the inside." This is plain enough. Despite this, however, some inspectors would prefer to have the qualifying word *readily* removed from Section 450-2.

In my opinion, such an omission would do more harm than good; for, as it now stands, transformers and vaults must be readily accessible to qualified persons only; which, clearly in this case, permits the use of locks. But without the readily accessible provision, access

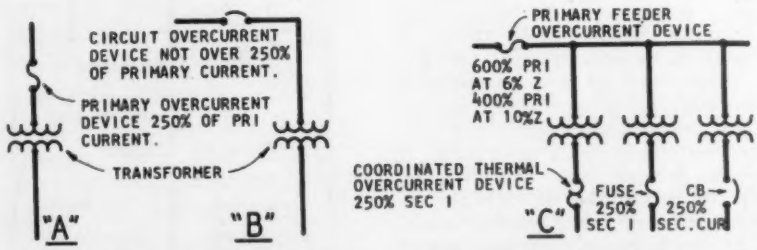

CIRCUIT OVERCURRENT DEVICE NOT OVER 250% OF PRIMARY CURRENT.
PRIMARY OVERCURRENT DEVICE 250% OF PRI CURRENT.
TRANSFORMER
"A"
"B"
PRIMARY FEEDER OVERCURRENT DEVICE
600% PRI AT 6% Z
400% PRI AT 10%Z
COORDINATED THERMAL OVERCURRENT DEVICE 250% SEC I
FUSE 250% SEC I
CB 250% SEC. CUR
"C"

Fig. 3—Transformers are required to have overcurrent protection on the primary side as at "A" not to exceed 250 per cent of the rated primary current unless the circuit overcurrent device provides primary protection not exceeding this amount as at "B." They are also required to have this protection unless a secondary overcurrent device is provided which is rated or set at not more than 250 per cent of rated secondary current and the feeder primary overcurrent device does not exceed 600 per cent of the primary current of the largest transformer. This is for transformers with 6 per cent impedance; it is 400 per cent for transformers with over 6 per cent, but not over 10 per cent impedance, as shown at "C."

doors could be not only locked, but also *blocked*. Worse, access could then be only by means of trap doors without hinges secured by screws. As the rule now stands, unqualified persons can be locked from the areas; yet, access by qualified persons cannot be unduly obstructed.

Overcurrent protection for transformers is required by Section 450-3. This section requires an individual overcurrent device in the primary connection of each transformer (as in "A" of Figure 3) unless (1) the circuit supplying this transformer provides equal protection (as in "B" of Figure 3), or (2) unless individual overcurrent protection devices are installed in the secondary connection of each transformer (as at "C" in Figure 3), in which case, the individual primary overcurrent device may be omitted provided that the primary feeder overcurrent device does not exceed 600 per cent of the primary current for transformers with six per cent impedance and 400 per cent of the primary current for transformers with over six per cent but not over ten per cent impedance. The secondary overcurrent device in such cases may be either a fuse, a circuit breaker, or a coordinated thermal overload protective device provided with the transformer by the manufacturer.

Fusing potential transformers

Potential transformers have no requirements, but Paragraph (c) of Section 450-3 recommends for their protection the use of primary fuses not in excess of 10 amperes for circuits of 600 volts or less, and not in excess of 3 amperes for circuits of more than 600 volts. This paragraph also recommends that a resistor " . . . be connected in series with high tension fuses when necessary to limit the possible short-circuit current to a value within the interrupting capacity of the fuse."

Overcurrent protection for secondary ties is required by Section 450-5 which also defines a secondary tie as being " . . . a circuit operating at 600 volts or less between phases which connects two power sources or power supply points, such as the secondaries of two transformers. The tie may consist of one or more conductors per phase." (See "A" Figure 4). Tie circuits are required to be protected at each end with overcurrent devices meeting the requirements for overcurrent devices in

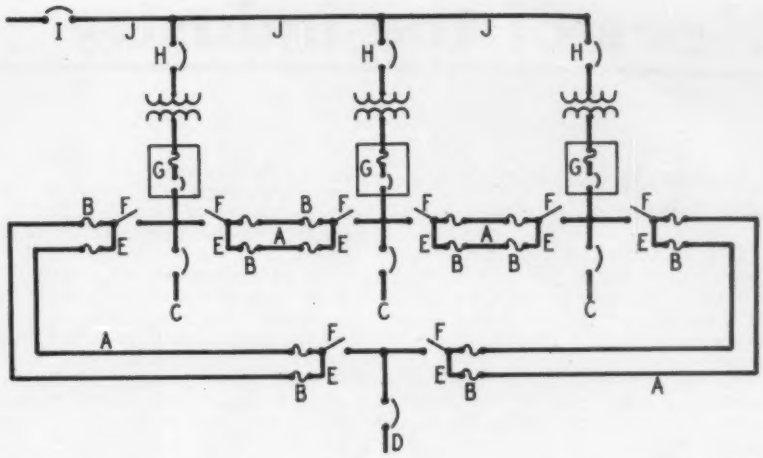


Fig. 4—Overcurrent protection for secondary ties is also required by the Code. Shown are "A"—secondary ties using, in this case, two conductors per phase; "B"—limiters or circuit breakers with equal time-current; "C"—secondary load connected at supply points; "D"—secondary load connected between supply points; "E"—interconnection of phase conductors; "F"—de-energizing switches; "G"—network protector with overcurrent device and reverse-current circuit breaker; "H"—primary overcurrent; "I"—feeder overcurrent; and "J"—primary feeders.

Article 240 or, (1) where all loads are connected at supply points (as at "C" of Figure 4) the tie shall have a capacity of not less than 67 per cent of the rated secondary current of the largest transformer or (2) where loads are connected between supply points (as at "D" of Figure 4) the tie shall have a capacity of not less than 100 per cent of the rated secondary of the largest transformer.

Under either condition, both ends of each tie conductor are required to be provided with a short-circuit protective device which will open on a short-circuit before the temperature damages the conductor insulation. This device can be either a fusable link known as a limiter (as at "B" of Figure 4) or a circuit breaker having comparable time-current characteristics.

Where more than one conductor is installed per phase, they must be interconnected (as at "E" of Figure 4) and each conductor protected by limiters or equivalent circuit breakers (as at "B" of Figure 4) except that loads may be connected to the individual conductors without interconnection where (1) the tie conductors of each phase have a total capacity of not less than 133 per cent of the rated secondary current of the largest transformer; (2) the rated load of such taps does not exceed the rated secondary current of the largest transformer; and (3) the loads are as equally divided on each individual conductor and on each phase as practicable.

Where the operating potential exceeds 150 volts to ground, the limiters and ties shall have a switch at each end (as at "F" of Figure 4) which will de-energize them when open. This switch is required to have a current rating not less than that of the tie conductors. "It shall be capable of opening its rated current, and it shall be constructed so that it will not open under the magnetic forces resulting from short-circuit current."

Where secondary ties are used, the secondary of each interconnected transformer is required to be provided with a network protector (as at "G" of Figure 4) consisting of an overcurrent device rated or set at not more than 250 per cent of the rated transformer secondary current and also a circuit breaker actuated by a reverse-current relay set to open at not more than the rated current of the transformer.

Section 450-6 permits transformers to " . . . be operated in parallel and protected as a unit when their electrical characteristics are such that they will divide the load in proportion to their rating."

Transformers are required to be protected from physical injury and to have operating voltages

(Continued on page 103)

News of the industry

edited for Southern readers

Economists say upturn will follow mild dip

THE NATION'S leading economists expect a mild dip followed by recovery in mid-1961 according to the 14th annual economists' opinion survey conducted by F. W. Dodge Corporation.

The economists polled also feel that corrections which have alreday taken place in the economy during the past several months will serve to lighten the severity of the expected downturn.

A sizeable group, 30 per cent of the 327 economists participating in the survey, feel that the economy will show no downturn at all between now and the end of 1961. However, 67 per cent expect some downturn in this period.

A special analysis of the replies from 50 large manufacturing companies indicated that this group was somewhat less optimistic than the average. This group feels that business activity, as measured by gross national product, will rise through the end of this year and then turn downward, reaching a trough in the second quarter of 1961, followed by recovery in the final half of next year.

The factors cited by the economists which provide the basis for concern about next year's prospects include lack of enthusiastic consumer demand, the squeeze on corporate profits, overcapacity in many industries, expected reductions in capital expenditures, continued high levels of unemployment, and the inventory correction now under way.

The report of the economists' opinions was prepared by Dodge's Edwin W. Magee, Jr., economist, and Edward A. Sprague, associate economist.

Contractor may have to pay back wages

AN OPEN SHOP electrical contractor at Jacksonville, Fla., who discharged five electricians because of union sympathies on August 15, 1959, may have to pay them all wages they lost between that date and last April 21, the date that he offered to rehire them without prejudice.

A trial examiner for the National Labor Relations Board recommended that the Board order the company to make up wages lost by these five men.

At the time of the discharges, the company had 25 to 30 electricians working on a large shopping center.

In a speech to the employees, the president of the company three days after the discharges explained: "that we run an open shop and we have to compete with open shop contractors where there is no union shop organization, and that is mostly small commercial work, medium commercial work, open shop, large commercial work, and then about 65 per cent housing and there are no union contractors doing that.

"I said, 'Now boys, if you all want to unionize this shop, the first thing you're going to do is put me out of business, lose your own jobs. . . . We just can't compete for houses under open shop conditions. In fact, I don't even see how—well, it's common knowledge that the union doesn't go after that type of work . . .'

"I explained to them very thoroughly about the situation and told them that they had one or two choices, if they wanted to go union, go on and go union, . . . but if they stayed with me it would have to be —if we stayed in the same field we were, it would have to be under open shop conditions. If I wanted to go after the bigger work, naturally I'd go in the union so I could go after it."

In addition to reimbursing the five electricians wages lost, the trial examiner recommended that the Board order the firm to stop discouraging membership in IBEW Local 177 and "in any other manner interfering with, restraining, or coercing its employees."

INTERNATIONAL SALES CONFERENCE—Holophane Co., Inc., of New York, held their general sales conference during October at the Dellwood Country Club, New York City. The meeting was attended by over a hundred members including the entire staff of district engineers from the United States, Canada, and Mexico. The program included several sales analysis sessions, engineering developments, and product seminairs. Attending from the South and Southwest were left to right: D. O'Bannon, E. Robinson, F. Zimmerman, M. Smith, F. Lott, J. Brinkman, E. Morales, O. Wood, J. Lough, and W. Gillis.

Housepower Box plan boosts wiring sales

MISSISSIPPI POWER COMPANY'S residential wiring program is now in full swing. Designed to give customers the complete comfort and convenience of all electric living, the program offers to all who qualify a modern outdoor housepower box plus a liberal installation allowance to assist the customer in paying his electrical contractor.

The Housepower Box program was adopted to help customers overcome the high cost of modernizing their home wiring.

Under Mississippi Power Compa-

Utility, industrial, contracting, and engineering personnel are able to visit the I-T-E trailer in their own working locations. The interior of the trailer has a metal-clad switchboard and disassembled circuit breaker on the right. Visitors can study equipment and view presentations in air-conditioned comfort.

ny's plan the company extends wiring up to and including the outdoor service panel (outdoor Housepower Box). The Housepower Box provides for six 230-volt circuits. The electrical contractor selected by the customer furnishes the labor and material exclusive of the Housepower Box.

The company's payments are as follows: 100-amp box, $40; 150-amp box, $55; 200-amp box, $75.

Special consideration is given to those customers requiring an installation of more than 200 amperes. To qualify, the customer must have installed at least two 230-volt circuits and install one 230-volt appliance (range, water heater, or clothes dryer).

The range circuit must be complete in all instances and a circuit for either a water heater or dryer will qualify as the other required circuit.

Since the program was introduced several months ago, a total of 273 Housepower Boxes have been installed. More than 300 additional applications are now in progress.

As a result of the 273 installations thus far, 186 ranges, 69 water heaters, 113 dryers, and 18 electrically heated homes were added to company lines.

New agency formed by Larry Strack

A NEW MANUFACTURERS' agency specializing in residential lighting fixtures, called Strack Associates, has been organized by Larry Strack, for the past six years factory representative for Globe Lighting Products of New York.

With headquarters at 85 Wyndham Drive N.W., Atlanta 19, Ga., the agency will handle only lines in the residential and decorative commercial fields.

Lines carried by the agency are Globe Lighting; Phoenix Lighting of New York; Bibi and Company of New York; Becker Manufacturing Company of Rosemeade, Calif.; and Active Specialty Corporation of Walden, N. Y.

The agency will cover Georgia, Alabama, and Tennessee.

AIEE board picks 14 new Fellows

THREE SOUTHERNERS were among 14 new Fellows of the American Institute of Electrical Engineers named by the AIEE board of directors.

G. Everett Farmer, chief of the communication and design branch of the Tennessee Valley Authority, Chattanooga, Tenn., was granted the honor, ". . . for contributions to the development of a comprehensive communication system for a large power system."

Marcus H. Lovelady, vice-president and chief engineer, Central Power and Light Co., Corpus Christi, Tex., was chosen ". . . for contributions to the Southwest Power Pool Interconnected System and to engineering and management of an expanding power system."

Thomas E. Marburger, vice-president of engineering and construction, Baltimore Gas and Electric Co., was selected ". . . for contributions to the management of construction, operation, and engineering of a major electric utility system."

I-T-E uses trailer to show switchgear

IN A CAMPAIGN to save valuable man hours for customers and show its newly-designed 4160-volt switchgear, Philadelphia's I-T-E Circuit Breaker Company is sending its demonstration trailer on a nationwide, year-long "door-to-door" tour.

The 44-foot mobile unit will give practical, on-the-spot demonstrations of the recently-introduced equipment to hundreds of customers and prospects in every state, except Alaska and Hawaii.

Now on the first leg of its tour, the trailer is going directly to electric utilities, industrial plants, and contractors' and consulting engineers' offices where groups of from five to 15 persons are expected to attend two-hour sessions at each location. Given by field office representatives, the meetings will consist of the showing of an 18-minute sound film, a complete demonstration of the equipment, and a question-and-answer period.

Arranged in meeting-room style, the interior of the trailer is outfitted with 18 chairs, a film projector, screen, back-lighted color transparencies of the equipment's components, and an actual circuit breaker and switchboard. The trailer is air-conditioned, carries its own generator to power the electrical devices, and has coffee and cold-drink dispensers.

The 4160-volt breakers and switchgear are used by electric utilities at power generation and distribution stations, and by industrial plants and in commercial buildings for switching, control and protection of mo-

tors, generators, distribution circuits, transformers, and other electrical equipment and machinery.

Totty named president of Southern Section IAEI

OFFICERS for the Southern Section of the International Association of Electrical Inspectors have been elected for the 1960-61 term.

President is A. M. Totty, Nashville; first vice-president, S. W. Thomas, Shreveport; second vice-president, C. L. Fogelgren, Princess Anne, Va.; secretary-treasurer, A. M. Miller, Richmond, Va.; assistant secretary, M. L. Young, Fairfax, Va.; and chaplain, C. B. Grauer, Jackson, Miss.

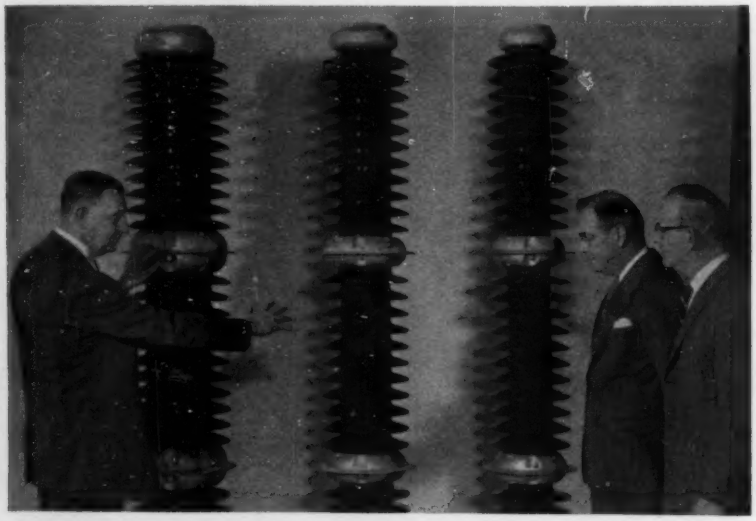
"Power/Liner" shows new A-C distribution

ALLIS-CHALMERS' latest "engineering demonstrator" on wheels, the "Power/Liner," recently embarked on a nationwide tour, bringing to utility and industrial engineers the latest advances in electrical distribution systems. Demonstrator theme is "Pacing Engineering" through distribution, regulation, and protection.

Featured in the air-conditioned traveling demonstrator scheduled to visit major U. S. cities, coast to coast, are the new Aluma-Clad switchgear, demonstrating the operating sequence of instantaneous transfer between breakers; a vacuum capacitor switch with memoscope to show interrupting performance of the vacuum switch for capacitor switching; a 50-kvar, 4,800-volt capacitor and a cutaway model to show the extended foil construction; a static relay demonstration console; Type "L" low voltage structure unit containing an LA-75A and LA-50A breaker equipped with static trips and with stored energy closing mechanisms; and the unique Regu/Tran, furnishing integral transformer, regulator assembly—a new space-saving concept.

An outdoor oil breaker with a magnetic air breaker demonstrates an emergency "throw-over" power source transfer, each breaker operating through a stored energy closing mechanism. The transfer time is indicated on a cycle counter.

The new Allis-Chalmers "engineering demonstrator" on wheels has begun a nationwide tour of utilities and industrial installations.



RAIN DEFLECTOR—Left to right, Ralph Jenner, president of the Lapp Insulator Co., Inc., demonstrates the principle behind Lapp's new electrostatic rain deflector as Brent Mills, executive vice-president, and John Innes, sales manager, look on. The device was developed for use with the company's line of high voltage station posts rated 900 kv. BIL, and higher. The deflector solves the problem common to all tall stacks of insulators, that of rain water accumulating and running down the stack to flood the lower insulators, reducing the wet flashover characteristics of the stack. Deflectors disperse water into the surrounding electrostatic field surrounding the insulator.

Promotions to help selling of Luxtrol

A $200,000 CARAVAN of light is one of eight promotions Superior Electric Company is making available to electrical wholesalers to help them sell good home, office, and industrial lighting, with Luxtrol light controls.

The caravan consists of a custom-built highway coach and a specially designed house trailer. It has visited nearly every state, made hundreds of showings under the sponsorship of electric utility companies and Luxtrol distributors.

Electrical wholesalers tie-in with this promotion by inviting architects, builders, and electrical contractors to attend either special showings or the public showings which are usually held at shopping centers.

Other promotions include a 24-minute full color motion picture entitled "Light—As You Like It," a sound slide film on "How to Decorate Your Home with Light," a woman's

club program made to order, a booklet on home lighting, mailing literature for home builders, and packaged commercials for TV, radio, and newspapers.

Soon to be available is a new series of mailings including booklets with such titles as "Candlelight Is Romantic," "Comfort for a Sick Child," "What's Your TV Eye Q?" and "Who's Afraid of Burglars?"

Progress announces new sales approach

CREATION of a new field sales management approach has been announced by Progress Manufacturing Co.

Mr. Frank Cody, of Atlanta, has been appointed regional manager of Progress' southeastern sales region, comprising Florida, Alabama, Georgia, and the eastern half of Tennessee.

Mr. Cody was a representative for the Moe Light Division of Thomas Industries beginning in 1954, and Moe's top volume salesman in the United States 1957-1958. In 1957 he was appointed district manager and

Frank Cody

in 1958 was presented the most outstanding merchandising award.

Will Turner, Progress vice-president, marketing, stated, "Mr. Cody's appointment is but the first of a series. With the increase in the size and complexity of its inter-related lines, Progress takes this step to ensure concentration of service and promotional activities to its distributors, and their customers."

G-E opens new regional and district offices

ESTABLISHMENT of a new Atlanta-headquartered regional sales operation to serve the electric utility industry in the Southeast and the appointment of Rudolph H. Jackson as manager have been announced by General Electric.

The company said the new sales organization will permit a more concentrated, creative, and balanced

TOGGLE BOLTS

TWO-WING SPRING TYPE

FINE QUALITY and SKILLFUL WORKMANSHIP are the distinguishing features of Arro Toggle Bolts.

This well made toggle bolt makes fastening to tile, plaster, wall board, or any type of hollow construction, quick and sure. Its lively spring, when released, spreads the steel wings into open position —tightening develops maximum holding power.

Used extensively by electricians, plumbers, decorators, maintenance men, sign men and many other tradesmen.

SCREW HEAD STYLES

TUMBLEHEAD GRAVITY TYPE

Falls into open position to fasten work securely against hollow walls.

RIVETED HEAD STUD BOLT TYPE

Falls into open position by gravity.

THE TRADE ARRO MARK LINE OF MASONRY ANCHORING AND DRILLING DEVICES

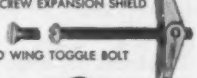
A-C-E EXPANSION SHIELD

O-E EXPANSION SHIELD

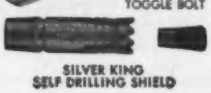
HOLD-IT EXPANSION SHIELD

DOUBLE EXPANSION SHIELD

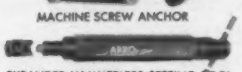
LAG SCREW EXPANSION SHIELD


TWO WING TOGGLE BOLT

TUMBLE TYPE TOGGLE BOLT


SILVER KING SELF DRILLING SHIELD

MACHINE SCREW ANCHOR

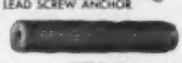

EXPANDER HAMMERLESS SETTING TOOL

MAL-LEAD BOLT ANCHOR

STUD BOLT ANCHOR

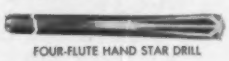
SPIRAL-DRIVE NAIL ANCHOR

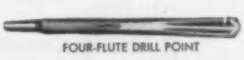
LEAD SCREW ANCHOR

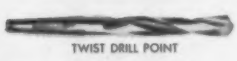

JUTE PLUG

ARRO-CORE MASONRY DRILL

ARROFLUTE CARBIDE MASONRY DRILL


FOUR-FLUTE HAND STAR DRILL


FOUR-FLUTE DRILL POINT


TWIST DRILL POINT

RUBBERGRIP DRILL POINT HOLDER

LITTLE MAJOR TURNBUCKLE

DISTRIBUTORS:

This Advertisement Appears in Leading Publications Directed to Your Customers

ARRO EXPANSION BOLT COMPANY

Dept. A. P. O., Box 388, Marion, Ohio

effort to be applied in marshalling General Electric's resources for the utilities of the fast-growing Southeast.

In his new post, Mr. Jackson will be responsible for directing and coordinating sales of G-E capital goods products to electric utilities through 14 strategically-placed local offices in Georgia, Florida, Alabama, Mississippi, Louisiana, and Arkansas.

Concurrently, Mr. Jackson announced the formation of five new district organizations and the promotion of five G-E executives based in the South as district managers. They include:

John C. Ager, Atlanta, manager of distribution equipment sales, Georgia - Florida - Alabama district; R. Howard Annin, Birmingham, manager of generation, transmission, and auxiliary sales, Georgia-Alabama district; Charles J. Ellis, Tampa, manager of generation, transmission, and auxiliary sales, Florida district; G. Harvey Kellermann, New Orleans, manager of distribution equipment sales, Louisiana-Mississippi-Arkansas district; and W. Stone Leake, New Orleans, manager of generation, transmission, and auxiliary sales, Arkansas-Louisiana-Mississippi district.

Dates ahead

AIEE Winter General Meeting, Hotel Statler, New York, N. Y., Jan. 29-Feb. 3, 1961.

Missouri Valley Electric Assn., Industrial and Commercial Sales Conference, President Hotel, Kansas City, Mo., Feb. 9-10, 1961.

National Rural Electric Cooperative Assn., Annual Meeting, Dallas, Tex., Feb. 12-16, 1961.

Southern Safety Conference and Exposition, Atlanta Biltmore Hotel, Atlanta, Ga., March 5-7, 1961.

National Lighting Exposition, Coliseum, New York, N. Y., March 5-8, 1961.

IAEI, Mississippi Chapter, Heidelberg Hotel, Jackson, Miss., March 27-28, 1961.

Southeastern Electric Exchange, Annual Conference, Boca Raton Hotel & Club, Boca Raton, Fla., March 27-29, 1961.

AIEE South East District Meeting, Jung Hotel, New Orleans, La., April 5-7, 1961.

IAEI, Georgia Chapter, Forrest Hotel, Rome, Ga., April 10-11, 1961.

IAEI, Ellis Cannady Chapter, Carolina Hotel, Raleigh, N. C., April 12-13, 1961.

Missouri Valley Electric Assn., Engineering Conference, President Hotel and Municipal Auditorium, Kansas City, Mo., April 12-14, 1961.

Southeastern Electric Exchange, Engineering & Operation Section, Hollywood Beach Hotel, Hollywood, Fla., April 12-15, 1961.

IES Southwestern Regional Conference, Skirvin Hotel, Oklahoma City, Okla., April 16-18, 1961.

IAEI, Alabama Chapter, Tutwiler Hotel, Birmingham, Ala., April 17-18, 1961.

Alabama Electrical and Electronics Exposition, Second Annual Exposition, Birmingham City Auditorium Convention Hall, Birmingham, Ala., April 17-19, 1961.

IES Southeastern Regional Conference, Atlanta Biltmore Hotel, Atlanta, Ga., April 19-21, 1961.

IAEI, South Carolina Chapter, Cabana Inn, Spartanburg, S. C., April 20-21, 1961.

IAEI Five - Chapter Joint Meeting—Baton Rouge, George Welman, North Louisiana-East Texas, Texas, and Texas Gulf Coast Chapters—Windsor Hotel, Abilene, Tex., April 28-29, 1961.

National Assn. of Electrical Distributors, Annual Convention, Detroit, Mich., April 29-May 3, 1961.

IAEI, Florida Chapter, Casa Marina Hotel, Key West, Fla., May 5-6, 1961.

IAEI, Executive Council, Statler Hotel, Detroit, Mich., May 14-19, 1961.

IAEI, Virginia Chapter, Hotel Roanoke, Roanoke, Va., June 12-13, 1961.

AIEE Summer General Meeting, Cornell University, Ithaca, N. Y., June 18-23, 1961.

IES National Technical Conference, Chase Park Plaza Hotel, St. Louis, Mo., Sept. 24-29, 1961.

National Electrical Contractors Assn., Washington, D. C., week of October 9, 1961.

AIEE Fall General Meeting, Statler-Hilton Hotel, Detroit, Mich., Oct. 15-20, 1961.

IAEI, Southern Section, Grove Park Inn, Asheville, N. C., Oct. 16-18, 1961.

Meier Electric names sales representatives

MEIER ELECTRIC, Indianapolis, Ind., has appointed several new sales representatives for the Southeast, George H. Will, district sales manager, announced recently.

Berry-Elsberry Co., Inc., Atlanta, has been assigned to Georgia, Alabama, Tennessee, and north Mississippi.

The Duke-Philibert Co., New Orleans, has been named to cover Louisiana and south Mississippi.

North Carolina will be the territory of the Paul Sherrill Co., Greensboro.

Deco Sales Associates, Miami, has been assigned to cover the state of Florida. Don Courtney is president of the company.

Brief news notes of manufacturers

THE FISHER-PIERCE Company has appointed the H. C. Langmack Company as sales representative. Mr. Langmack will handle the complete Fisher-Pierce line of photoelectric street lighting controls and associated equipment. From his office at 9005 Linton St., Silver Spring, Md., Mr. Langmack will cover Washington, D. C., Virginia, and all of Maryland except the eastern shore.

* * *

PRODUCTION of standard fractional horsepower motors has started at the new manufacturing plant of Wagner Electric Corporation at Brinkley, Ark.

The modern, one-story, 90,000-square foot building was designed for a continuous-flow layout of machines, assembly lines, and testing equipment, to enable the company to increase production to meet the growing demand for its small motors.

* * *

MULTI-AMP Electronic Corp., Union, N. J., has recently appointed as representative for western Pennsylvania and northern West Virginia Burns Electric Co., 1750 North Highland Rd., Pittsburgh 28, Pa. The representative will handle Multi-Amp's high-current, low-voltage test units for circuit breakers, relays, reclosers, and transformers; also other devices such as transformer-type load boxes and power supplies, meter calibrating equipment, test benches, and units built to customer specifications.

News about people

M. L. (Tiny) Tice, associated for many years in various capacities with the electrical industry of the Southeast, passed away recently at his home in Daytona Beach, Fla. Mr. Tice had served the Southeastern Electrical Wholesalers Association as managing director from the time it was first organized until it was disbanded in 1958.

Duke Power Company's board of directors named a vice-president and three assistant vice-presidents at a recent monthly meeting in Charlotte.

Elected vice-president was **G. G. Mattison,** formerly manager of production and transmission. Appointed assistant vice-presidents were **Channing B. Brown,** formerly manager of the industrial power department; **Charles B. Miller, Jr.,** formerly manager of distribution engineering and operation; and **Herman B. Wolf,** formerly manager of operations. All four men reside in Charlotte.

Ben R. Askew, of Atlanta, manager of the Georgia Power Company's industrial sales engineering division since 1953, has been promoted to the post of administrative assistant in the sales department of the company's general office. Succeeding Mr. Askew to the managerial post is **Roy W. Wages,** of Atlanta.

Mr. Askew holds the degree of bachelor of science in electrical engineering from the University of Arkansas. He joined the company in 1928, serving as a division power salesman at Dublin. He is a registered professional electrical engineer.

Ben R. Askew

Roy W. Wages

Mr. Wages holds the degree of bachelor of science in electrical engineering as well as the graduate degree of electrical engineer from Auburn University. He also holds the bachelor of laws degree from Woodrow Wilson Law School. Mr. Wages joined the company in 1935 as a member of the meter department. He has been in industrial power sales activities for the company since 1936. He is also author of the book, "Electricity and Electrical Power."

Arthur Kaufmann has assumed the added responsibility of the newly created post of assistant general manager of Kuhlman Electric Co., Birmingham, Mich. Mr. Kaufmann, who joined Kuhlman Electric in 1956 as treasurer, and was made vice-president a year later, will continue as vice-president and treasurer.

Mr. Kaufmann will assist **H. E. Greenwalt,** executive vice-president and general manager, in general operations and administration.

James F. Graff has been appointed a district sales manager for the Wadsworth Electric Manufacturing Co., Inc., Covington, Ky. His territory will include Florida, and the southern parts of Georgia and South Carolina. Mr. Graff has been associated with Wadsworth since 1951.

Arthur Cecil Roe, 69, staff engineer of the National Industrial Service Association, Inc., and widely-known author of textbooks and magazine articles on the repair of electric motors, died at St. Louis, Mo., hospital, October 28.

Mr. Roe had joined NISA, international trade organization of 1,600 electrical apparatus service firms in North America, in September, 1958, after retiring from the Westinghouse Electric Corporation where he had

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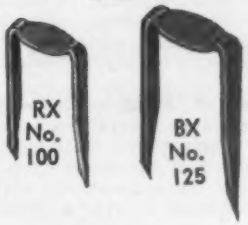
"SNAPER" STRAPS
T. M.®
FOR THIN WALL & RIGID CONDUIT

THE SNAPPER

SNAP ON—STAY ON

THE STANDARD . . .
. . . THE ORIGINAL
"NOB" STAPLES
T. M.®



There is a difference- Why take less?

W. W. CROSS & CO. — JAFFREY, N. H. — FASTENERS SINCE 1869

General Sales Agents _____ J. J. WALSH COMPANY _____ Greenville, R. I.

been employed for 46 years as a shop superintendent and as a consulting and design engineer in New York, Detroit, and Pittsburgh.

John M. Townsend has been elected president and a director of Continental Electric Equipment Co., Cincinnati, at a meeting of the board of directors.

John B. Cottell, former president, was elected chairman of the board.

Guglielmo C. Camilli has retired from General Electric's power transformer department at Pittsfield, Mass.

Mr. Camilli, who retired last month from his position as supervisor of advance product engineering, had been with the company for 36 years. During this time he was awarded 63 patents on inventions, ranging from transformer test equipment to a mechanism used for automatically opening and closing a camera lens. At present he has seven patents pending.

On two occasions he received G.E.'s top employee honor—the Coffin award. The first of these awards was made for the development of a flux voltmeter, a device for measuring transformer core loss, which is still in common use today. The later Coffin award was for a newly-designed instrument transformer of greatly reduced size and weight.

Joseph J. Archibald, Jr., sales manager of the consumer products division of Jefferson Electric Co., has been named manager of advertising and public relations for the Bellwood, Ill., electrical manufacturer.

Mr. Archibald, who will retain his sales management position in addition to his new post, served as the firm's advertising and sales promotion manager for three years prior to assuming responsibility for sale of Jefferson's consumer line of electric gift clocks in 1956.

Alfred H. Tessmann of Chattanooga has been appointed vice-president of Central Cable Corp., in charge of the southern division, with headquarters at the corporation's new manufacturing facility in Tucker, Ga.

Howard V. Stiles, executive vice-president and general manager of Chester Cable Corp., Chester, N. Y., a subsidiary of Tennessee Corp., has announced the appointment of **Benjamin Levinson** as chief engineer.

The appointment of **Ray W. Thompson** as general sales manager, marketing division, has been announced by **M. P. Kartalia,** vice-president, marketing, Square D Co.

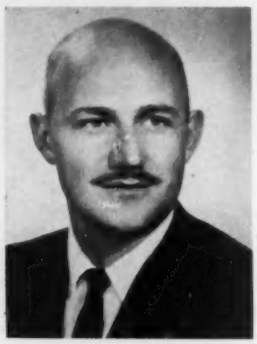
In his new capacity Mr. Thompson will spend a major part of his time in field contact, acting as liaison between headquarters and Square D's various sales regions. He will operate from the company's new corporate headquarters in Park Ridge, Ill. He has been serving as midwestern region manager during the past year.

Concurrent with Mr. Thompson's appointment, **Kurt Morris** has been named midwestern region manager. Formerly merchandise sales manager in charge of Square D regional warehouses, Mr. Morris will make his headquarters in the offices of the Schiller Park, Ill., plant.

William J. Moriarity will assume Mr. Morris' warehouse responsibilities while continuing in his present position as manager, distributor relations.

Robert Gand has been appointed director of merchandising for the Benjamin division of Thomas Industries, Inc., Des Plains, Ill.

The appointment of Mr. Gand and four other executives in the Benjamin merchandising department was announced by **Otis Zumwalt,** vice-president in charge of merchandising for Thomas Industries.



Robert Gand

The other new appointments include **Robert Geocaris** and **Fred Farley** as merchandise managers of specific product lines; **Ray Hurley** as chief designer; and **Donald Englebretsen** as merchandising assistant.

Mr. Gand joined Thomas Industries ten years ago as a St. Louis area sales representative in the Moe Light division and later became district sales manager in the Chicago area. He is a graduate of the University of Illinois.

As merchandising manager for the Benjamin division, Mr. Gand succeeds Michael N. Flynn, who recently was appointed sales manager for Benjamin.

Robert Geocaris becomes merchandise manager of the entire line of Benjamin recessed troffers. A graduate of the University of Chicago, Mr. Geocaris has had 14 years experience in the engineering and selling fields of heating, piping, and air handling troffers.

Fred Farley is merchandise manager of the commercial fluorescent product lines. Mr. Farley most recently was a sales representative for Thomas Industries in Portland Ore.

Ray Hurley, as chief designer, is responsible for new product design. He has been in the lighting fixture business more than 30 years, and is considered one of the country's leading authorities on commercial fluorescent product design.

Donald Engelbretsen, who will be merchandising assistant, has been with Benjamin five years where, as assistant to the advertising manager, he worked on many of the new product catalogs.

The appointment of **John A. Kelly** as manager - customer service and marketing administration has been announced by **R. C. Hanna,** manager-marketing, circuit protective devices department, General Electric Co.

In his new position, Mr. Kelly will be responsible for the customer service operation, which provides customer and order service, as well as warehouse facilities.

In addition, he will have responsibility for the department's marketing research and administrative functions, including evaluation of market potential and position, sales forecasting, and budget administration.

Duke Power Company, Charlotte, has announced three managerial changes in its production and transmission department.

J. E. Chapman, general superintendent of the electrical maintenance and construction department, was named manager of that department. **E. B. Shuler,** former superintendent, transmission lines, was appointed manager of the transmission lines department. Succeeding Mr. Shuler is **W. T. Reeder, Jr.,** who was transferred to the transmission lines post from the electrical maintenance and construction department.

Robert R. Wylie, previously marketing manager of Sangamo Electric Co., has been appointed manager of the company's newly formed electronic products sales group. The group was organized to handle marketing of the company's capacitors, inductive components, sonar, tape transports, and other electronic system equipment.

Glenn DeKraker, former assistant marketing manager, has been named manager of marketing services, and will also assist Mr. Wylie as sales manager for electronic systems.

Howard J. Wilson, 4663 Ridgeview Road, Dunwoody, Ga. manager of the Georgia Power Company's merchandise division for the past ten years, has been promoted to the post of assistant to the vice-president, Atlanta division.

Mr. Wilson was graduated from Creighton Business College and has done advanced study in business administration at LaSalle University. He joined Georgia Power as a salesman in 1929.

Technical books

for the electrical man

Basic electricity

"Exploratory Electricity," by Schank and Arnold. Published by McKnight and McKnight Publishing Co., Bloomington, Ill., 104 pages, $1.25.

This text-notebook is designed as a basic text for a 12-week course in junior high school. It places emphasis on the production, safe use, and on understanding the various kinds of electricity.

This new book gives beginners a broad understanding of electricity by having them explore a variety of activities. Through projects and problems the students learn how electricity works for us in everyday life, and how it can be controlled safely and put to better use. Occupations are discussed and analyzed in a language that young people can understand.

A teacher's manual is furnished free of charge to each teacher using "Exploratory Electricity." This manual not only gives answers to the questions in the text, but also gives information on supplies, construction, and use of activity boards, tools, shop layout, and other subjects.

Electric heating

"Electric House Heating," Published by Rural Electrification Administration, U. S. Department of Agriculture, Washington 25, D. C., 19 pages, 20 cents.

This book discusses many aspects of electric house heating. Revised in September, 1960, it contains up-to date information useful to both contractors and consumers.

Topics discussed include functions of a house heating system, methods of heat transfer, electric heating equipment, heating material and construction requirements, estimating and computing heating requirements, approved equipment, and wiring.

It contains tables and formulas. Temperature maps of the United States, costs, and a bibliography are also included.

Fire Codes

"National Fire Codes," Published by National Fire Protection Assn., 60 Batterymarch St., Boston 10, Mass., seven volumes, 5614 pages, $7 per volume, $40 for seven volumes.

The 1960-61 issue of this authoritative reference work incorporates important changes in many fire safety standards, according to Robert S. Moulton, technical secretary of the association.

The seven-volume 1960-61 edition is a compilation of the 181 standards developed by NFPA in the fields of flammable liquids and gases, combustible solids, dusts, chemicals and explosives; building construction and equipment; extinguishing equipment; electrical installations; and mobile fire equipment, transportation, and management.

New material includes 42 new or revised fire safety standards adopted at the 1960 annual meeting of the association, and incorporates all amendments approved by the NEPA board of directors up to and including July 30, 1960.

The seven new volumes, with a total of 5614 pages, by content, are I—flammable liquids and gases; II—combustible solids, dusts, chemicals, and explosives; III—building construction and equipment; IV—fixed extinguishing equipment; V—electrical; VI—transportation; and VII—mobile fire equipment, organization, and management.

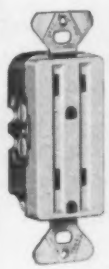
Technical illustrating

"Technical Illustration," by Anthony D. Pyeatt, Publications Engineer, Douglas Aircraft Co., Missile Engineering Dept. Published by Higgins Ink Co., Inc., 271 Ninth St., Brooklyn 15, N. Y., 125 pages, illustrated, $5.00.

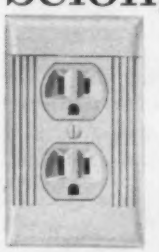
This one-volume course in technical drawing covers subjects ranging from elemental use of drawing equipment to perspective illustrating of missiles. Slanted toward planes and missiles, the course gives detailed practical advice useful in any type of precision drawings, whether for wiring layouts, assembling directions, or simply informative perspective illustrations of equipment or parts.

Chapters cover industrial visual aids, perspective drawing, axonometric drawing, time savers, correct use of drawing ink, rendering techniques, and technical manual illustration. A collection of sample drawing problems, complete with detailed explanations and illustrated steps in completion, is also included.

Included in the technical manual section are instructions for various views, including overall, cutaway, phantom, exploded, action, schematics, and charts and graphs. Writers' instructions are also included, along with directions for making page layouts.



Not so many years ago, a new line of wiring devices and wall plates walked in to make great names look to their laurels. Now the laurels belong to...



SIERRA

Switches, Receptacles, Wall Plates
– A complete line of wiring devices
sold only through Electrical Distributors

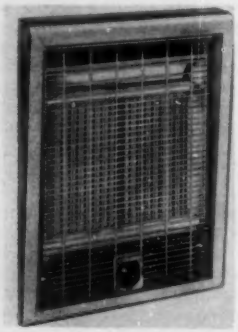
SIERRA ELECTRIC CORPORATION
15100 South Figueroa • Box 85 • Gardena, California

New products

Cavalier wall insert heater

Totally enclosed elements are featured on the newest wall insert heaters of Cavalier Corp., 343 West First St., Chattanooga 2, Tenn. This is the first radiant convector automatic electric heater on the market with this advanced safety feature.

The new Cavalier heating elements have nickel-chromium wire embedded in cordierite ceramic. This is



generally accepted by engineers as a fine combination for efficiency and long trouble-free service. These heating elements are warranted against burnout for ten years.

Cavalier maintains its feature of superlatively easy cleaning. The enameled grille lifts out and the solid aluminum reflector is hinged at the bottom to tip forward for easy cleaning. This Cavalier heater can be completely cleaned in three minutes or less.

Write P-1221 on reply card, pg. 17

Prescolite mirror lamp

Prescolite Manufacturing Corp., 2229 4th St., Berkeley, Calif., announces a new wall fixture designed primarily as a mirror light in bedrooms and bathrooms.

The fixture is rated for two 100-watt bulbs, can be mounted vertically or horizontally to any standard electrical outlet box, and measures

6 x 17¾ x 5 inches deep.

Its contemporary glass is hand-blown in satin-finished Thermopal, assuring uniform light distribution without hot spots. An engineering departure on the glass mounting principle has been made, and the glass is hinged so that it can be swung easily away for cleaning or relamping, and still be held securely to the rest of the fixture while these maintenance operations are taking place.

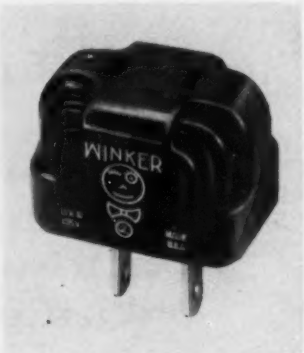
Write P-1222 on reply card, pg. 17

Eagle outlet winker

Although attractively re-designed and molded in red bakelite, the famous Eagle outlet winker still retains all the engineering features gained from 30 years experience by Eagle Electric Manufacturing Co., Inc., 23-10 Bridge Plaza South, Long Island City, N. Y.

The Eagle winker, catalog No. 471, is designed for signs, Christmas lights, etc., and provides 14 to 16 flashers per minute. The winker mechanism is completely enclosed, with no unsightly washers. Its new design permits a standard duplex receptacle to accommodate two winkers.

Engineered with watch-like precision, the Eagle No. 471 Winker incorporates these features: a longer and wider bi-metallic element to flex



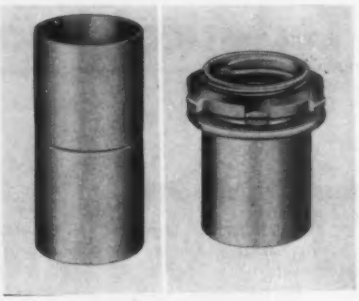
more easily and without damage; a larger, wider element to accommodate enough wire to prevent overheating of coil; winding on specially developed machines to lay down wire evenly and without bunching; and wide, pure, silver contact points that will not pit easily.

Write P-1223 on reply card, pg. 17

ETP indenter fittings

Electrical Tubular Products, 74-16 Grand Avenue, Maspeth, New York City, N. Y., has just added indenter set screw couplings and connectors to their ETP line of electrical fittings.

Precision made of specially formulated soft steel for each clinching,



these new indenter fittings feature extra heavy duty locknuts on rolled thread base. ETP indenter type fittings are solid one-piece tubular steel, U-L listed, as concrete tight. They cannot open or spread to leak sand and water.

Each fitting is zinc chromate plated for resistance to corrosion. ETP indenter fittings are uniformly concentric, engineered to provide easiest on-the-job wiring. They are available in ½-, ¾-, or 1-inch sizes in handy, easy to identify boxes.

Write P-1224 on reply card, pg. 17

Aluminum rigid conduit

A new aluminum rigid conduit line in standard trade sizes ½-inch through six inches has now been made available to the electrical industry by Wheatland Electric Products Co., 500 Logan St., Carnegie, Pa.

The aluminum rigid conduits are furnished in 10-foot lengths with threaded coupling attached. Plastic thread protectors are color-coded to facilitate size identification in distributor stocks.

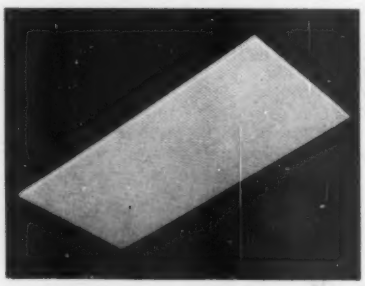
Aluminum conduit couplings and elbows of 90 degrees, 45 degrees, and 30 degrees are available as standard radius in the full range of sizes. Special radius elbows are also available.

The new Wheatland Electric aluminum conduit line is listed by Underwriters' Laboratories, Inc., and conforms to federal specification WWC-005450 (GSA-FSS).

Write P-1225 on reply card, pg. 17

American louver diffuser

A new 55-degree lighting louver diffuser is being manufactured by the American Louver Co., 5308 North



Elston Ave., Chicago 30, Ill.

The louvers provide extraordinary low brightness appearance with the utmost in lighting efficiency. When the lovers are viewed from a slight angle the cubicles create an overall blend-in luminous effect and hide the lamp source for optimum light diffusion.

The louvers are readily adaptable to overall luminous ceilings or installed in individual fixtures of any length or width. They are of tough, strong one-piece color stable construction, made up of 25/64-inch cubicles, 1/2-inch high.

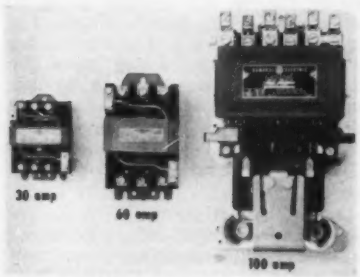
Panel size is 23¾ inches x 47¾ inches. They may be cut or grooved to meet any specification requirements. Louvers are available in white and pastel colors of pink, yellow, green, blue and low brightness gray.

Write P-1226 on reply card, pg. 17

General Electric contactors

A new line of lighting contactors for tungsten, fluorescent, and mercury arc lamps has been announced by General Electric's General Purpose Control Dept., Bloomington, Ill.

Designed especially to handle the high inrush currents for tungsten lamps, the new lighting contactors



do not require derating, according to company engineers. Gas-filled tungsten lamps have inrush currents approximately 15 to 17 times their normal operating currents and conventional contactors must be derated to prevent possible welding of contacts on high inrush currents.

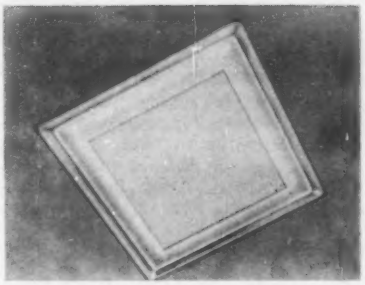
Specifically designed for such loads, the new contactors can be applied at full rating. This makes the new line highly adaptable whenever remote control of lighting circuits is required.

The new CR160L, CR2810, and CR2811 lighting contactors are available in 30-, 60- and 100-ampere forms, two-, three-, or four-pole, with open or enclosed construction.

Write P-1227 on reply card, pg. 17

Smithcraft fluorescent unit

The Lyric, a smart, completely enclosed lighting unit, has been introduced by Smithcraft Corp., 217 Everett Ave., Chelsea 50, Mass. The new



fixture features a large polystyrene plastic dish shielding with softly molded corners. The shielding extends beyond the housing sides to create an extremely neat and trim appearance and to illuminate the sides. The Lyric is available as a surface unit or as a coffered unit, with a fiberglass plastic flanged coffer shell, or with a coffer for plaster ceilings.

The Lyric comes in two by two feet, two by four feet, and four by four feet sizes. The polystyrene shielding is available with a plastic louver insert, or as a regular one-piece shielding. The shielding offers pleasing, even illumination, with no light leaks. The sides of the Lyric are illuminated with softly diffused light. For fast, easy maintenance, the shielding hinges and opens from either of two sides.

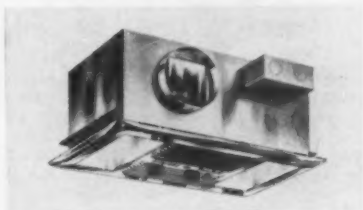
A completely new idea in fluorescent lighting, the Lyric is especially well-adapted for use in modern offices, schools, stores, and other new installations where pleasant, even, and unobtrusive illumination is desired.

Write P-1228 on reply card, pg. 17

Progress ventilator-light

Now, a single, easy installation satisfies two basic home needs—light and ventilation. Progress Manufacturing Co., Castor Ave. and Tulip St., Philadelphia 34, Pa., introduces its new ventilator-light (PV 7895).

Adequate light is assured by two 60-watt lamps, with fine Corning Albalite glass diffusers. A quiet, powerful impeller unit provides effective air movement over a wide radius. A ventilator-light offers simple plug-in connection for fan motor and lights.



NONE BETTER
than
KNOX
WIREHOLDERS
The No. 5009 has been designed to satisfy the most critical requirements — metal parts in tension and porcelain in compression. All steel parts are HOT-DIP GALVANIZED. The Porcelain has been designed with well-rounded edges and provides a larger, pulley-action wire hole. The spun solid copper rivet interlocks the Insulator with the metal portion of the Wireholder. Extra sharp screw thread for easy starting and full threaded. The heavy screw-shank base offers high resistance to side pull. KNOX No. 5009 Wireholders far surpass recommended ratings on standard house service conductors. This Wireholder can also be supplied with 22 x 3" and 22 x 4" Screws.
No. 5009
KNOX has numerous styles and types of Porcelain Wireholders.
No. 418
HEAVY DUTY
No. 411
MEDIUM DUTY
No. 405
LIGHT DUTY
Always Specify
KNOX
WIREHOLDERS
KNOX PORCELAIN CORPORATION
KNOXVILLE 1, TENNESSEE
Send for Catalog

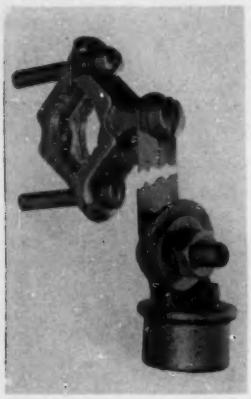
The crome grille is lifetime-guaranteed and triple plated.

Other features include removable duct sleeve connector, built-in back draft damper, and removable junction box. Mounting flanges are adjustable and unit fits between standard 16-inch joists. The snap-in grille is adjustable to plaster thickness.

Write P-1229 on reply card, pg. 17

Sherman ground strap fitting

A new type ground strap fitting which speeds up installation and insures a positive ground has been developed by the H. B. Sherman Man-



ufacturing Co., 22 Barney St., Battle Creek, Mich.

The flexible strap-type clamp facilitates installation when joining conduit to grounding devices. Only one connection for both wire and strap is required with this new ground clamp. Non-corrosive, bronze, alloy allows the user maximum conductance.

Write P-1230 on reply card, pg. 17

Bell tamperproof snap-cover

Recently announced by Bell Electric Co., 5735 S. Claremont Ave., Chicago 36, Ill., is the new tamperproof snap-cover which protects outdoor receptacles and switches against moisture, rain, snow, and ice. It also protects against vandalism, current pilfering, and accidental shock.

A built-in hasp permits use of a padlock on the popular Saf-T-Lok® weatherproof device. A single, long, deep snap-cover allows use of two large plug caps side by side, in any of 14 different one-, two-, and three-gang combinations.

Bell's Saf -T- Lok weatherproof snap-cover is designed for vertical mounting providing complete weatherproof protection and allowing the mounting of lids side by side, in any number of gangs.

It has wide appeal for residential applications serving power mowers, electric hedge clippers, and tools. It also covers many uses in industrial, railroad, farm, aircraft, and commercial applications. The cover locks in open position when in use, and snaps shut to closed position when not in use.

Write P-1231 on reply card, pg. 17

Pennington field office

The new Pennington expandable add-on units, designed for use as a contractor's field office, are constructed of heavy gauge steel that has been bonderized and zinc coated to assure years of weather protection, and are made by Pennington Manufacturing Company, Addison, Ill.

A basic building unit measures 8' x 11' at the eaves; clear inside

headroom, 6'5"; and height at peak, 7'3". Doors open to a width of 72". Units may be purchased in multiples as desired, with double doors in one end or both ends and with or without windows.

Write P-1232 on reply card, pg. 17

Electric unit heaters

A new series of electric unit heaters has been added to the Chromalox unit heater line of Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa.

The new unit heaters, designated type LUH, are designed to solve space heating problems in factories, public buildings, stores, garages, warehouses, and other similar establishments.

Smart appearing and compact in construction, these heaters have sturdy metal sheath Chromalox Fintube electric elements with built-in line voltage overheat protection. Wide fin spacing permits efficient, economical operation even in dirty atmospheres.

The fan motor is totally enclosed and also has built-in thermal overload protection. The fan is accurately balanced and is sized to maintain correct relationship of air volume to final air temperature. A fan safety guard is standard on all models.

Write P-1233 on reply card, pg. 17

New product briefs

Calon Manufacturing Co., Oakland Avenue and Pennsylvania Railroad, Washington, Pa., announce the availability of their new plastic **zip cord,** also known as lamp cord wire. Calon's plastic zip cord is an all-purpose, flexible plastic parallel cord which is easily separated by a slit in the jacket. U-L listed, it is so flexible that it resembles rubber, yet its pure vinyl insulation will resist oil and gasoline. The cord is 18 gauge, 41 strands.

Write P-1234 on reply card, pg. 17

Columbia Cable and Electric Corp., 255 Chestnut St., Brooklyn 8, N. Y., announces the development of a new non-metallic sheathed **cable.** The major change is the addition of an aluminum paint finish which improves appearance and eliminates tar seepage. The new finish gives the cable a high resistance to peeling when twisted. The cable is available in sizes 14/2 to 4/3, with or without ground.

Write P-1235 on reply card, pg. 17

A new **ballast** for use with the recently announced 60-inch, 1.5-ampere rapid start fluorescent lamp has been introduced by **General Electric's Ballast Department,** Danville, Ill. The new **ballast,** model 6G3544, has Underwriters' Laboratories' listing. This ballast-lamp is suited for an industrial program of converting the conventional F90T17 switch start lamp and ballast to the new high-lumen-output 1.5-ampere rapid start system, according to company engineers.

Write P-1236 on reply card, pg. 17

The Okonite Co., subsidiary of Kennecott Copper Corp., has recently introduced a new small-diameter plastic control **cable,** Okonite P-30, a low cost general purpose control cable for utilities and industries, suitable for all types of installations in wet or dry locations. The cable is over 30 per cent smaller and lighter than conventional rubber cable, yet it offers advantages similar to those normally associated with these cables. Multi-wall construction offers three-fold electrical protection since the basic conductor insulation, its protective covering, and the overall jacket are all high quality dielectrics.

Write P-1237 on reply card, pg. 17

Helpful literature

available to our readers

An eight-page booklet, "The Electri-Warm Line," describing the company's **electric heating equipment**, has been published by **American-Standard**, Electric Heating Department, 40 W. 40th St., New York 18, N. Y. Among the products illustrated and described in the booklet are built-in wall heaters, baseboard heaters, ceiling and floor cable, ceiling heater panels, portable electric heaters, and heating controls.

Write B-1238 on reply card, pg. 17

The **Moe Light division of Thomas Industries Inc.**, 207 E Broadway, Louisville, Ky., has introduced a four-page brochure describing its new and complete lines of slimline and Strip Line **fluorescent lighting fixtures.**

Write B-1239 on reply card, pg. 17

Information and scope of the 50-year development of **automated equipment** and systems for electric utilities is contained in the new publication, "Automation for Electric Utilities" (GEA-7044), published by **General Electric Co.**, 1 River Rd., Schenectady 5, N. Y. All phases of system operation—generation, transmission, and distribution — are described in this three-color booklet which traces the electric utilities' use of automated equipment from the present back to unattended rotary coverter station for street railways in 1910.

Write B-1240 on reply card, pg. 17

Data folder No. 6008 for the electrical power and light industry contains technical data and test information on **H tap compression connectors.** Copies are available from the publisher, **Jasper Blackburn Corp.**, 1525 Woodson Rd., St. Louis 14, Mo.

Write B-1241 on reply card, pg. 17

Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill., has published a new **fluorescent lamp ballast** buyer's guide, ATC-110, which provides up-to-date information on ballasts. The buyer's guide has been expanded to include complete listings of Kool-Koil ballasts, Advan-guard thermally protected ballasts, weatherproof ballasts and SHO, VHO and Powergroove ballasts.

Write B-1242 on reply card, pg. 17

A new 60-page **signaling equipment** catalog, bulletin S-100, has been issued by the **Edwards Co., Inc.**, Norwalk, Conn. In addition, the company also has published three supplementary catalogs. For maintenance staffs and engineers, bulletin S-100 C-I describes Edwards industrial and commercial building products, bulletins S-100-OEM details original equipment-type products for design engineers, and residential products are covered in bulletin S-100 R.

Write B-1243 on reply card, pg. 17

Code

(Continued from page 91)

posted on the equipment or on surrounding structures. Exposed non-current-carrying metal parts of transformer installations, including fuses, etc., are required to be effectively grounded except where mounted on wooden poles at more than eight feet above the ground. Usually such pole-mounted transformers are also grounded.

The transformer nameplate is required to indicate the name of the manufacturer, the rated kva, the frequency, the primary and secondary voltages, and the amount and kind of insulating liquid where used and where the rating exceeds 25 kva. The nameplate is required to indicate where Class B insulation is used in dry type transformers of over 100-kva capacity.

Transformer requirements will be discussed further in the next issue of this magazine.

Answers to Code test questions: (1. **T** Section 445-1) (2. **T** Section 445-3) (3. **F** Section 445-4-c) (4. **T** Section 445-4-e) (5. **F** Section 445-8) (6. **a** Section 450-2) (7. **b** Section 450-3-c) (8. **c** Section 450-1) (9. **c** Section 450-3) (10. **b** Section 450-5-a-5).

Multi-step process

(Continued from page 71)

After the cylinders have been closed and sealed, the treating process begins, performed by well-trained, experienced, treating engineers.

The poles are first steamed to complete their seasoning and to sterilize them, and they are then put through the required phases of the treating processes to insure the maximum penetration and the required retention of the preservative.

Crossarms are handled in the same careful way as the poles with full inspection and selection to insure the highest quality in the final product. Only the best logs are purchased to insure that the arms will have the required density of wood and will meet the

This KEY

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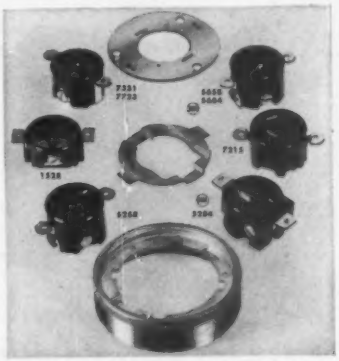
You asked for it—And now it's here—for our #190—NR Series

FULLMAN'S *Adjustable* **STEEL BOX**

190-N R Series
No Receptacle

A standard 4" octagon, brass-topped watertight floor box 2½" deep with brass adjusting ring permitting ½" height adjustment in addition to three screw legs 2½" long.
Box-body has 3¼" opening, making it easy to get hand into for conduit attachment or wire pulling.
Concrete can be poured to very top, also to box-body height only. A second tin lid is provided.
Fits most popular styles and size receptacles.



TO INSTALL—Drop the "KEY" into special slots built into adjusting ring—select the receptacle required and simply "LAY-IN"; then "LAY-ON" receptacle ring. This has been added at no extra cost. Very easy to install.

Sold Only Thru Wholesalers

Fullman
MANUFACTURING COMPANY
1209-1215 JEFFERSON ST.
LATROBE, PENNSYLVANIA

most rigid specifications. The logs are carefully cut on General Pole and Crossarm's own sawmills and only the center portions, where the best wood is, are made into crossarm blanks.

After cutting, the blanks are individually inspected and stacked on uniform stacks for kiln drying when required. After such drying under carefully controlled conditions, the blanks are dressed to the finished cross-section and automatically bored to the customers' specifications. They are then ready for pressure treatment and, like the poles to which they will be ultimately secured, go into the treating cylinders.

Testing takes place

A very important part of the preparation cycle is the testing for the results of treatment. Borer cores are taken and inspected and measured for depth of penetration. Retention tests are made in the laboratory adjacent to the treating plant. These tests are done by trained personnel by chemically extracting the preservatives from the sample cores taken from the treated materials and comparing the weight of the cores after extraction with their weight before. General Pole and Crossarm Company guarantees 95 per cent penetration of the sap wood which should give a life cycle up to 50 years. Naturally, different preservatives are used for varying conditions and customer requirements; but whatever "beauty cream" is specified, complete facilities are available to apply it.

The transformation is accomplished. Erect, tall, and graceful, the rough log has become a finished pole, a thing of beauty no less than of purpose, to be installed wherever it has to perform its lasting and important function.

Pole reuse

(Continued from page 74)

should be furnished with conversion tables for measurements above the groundline, since a measurement taken six feet from the butt on the unshaved part of the pole cannot be used to determine the new class.

Retreatment may consist of spraying with fungicide and insecticide, butt treatment by thermal process, full length treatment by thermal process, or bandage or other treatment at groundline area.

Economic considerations

Economic considerations should include the costs of inspection, of hauling to and from the treating plant, and of the treatment itself. It should be considered whether or not the cost of reinstalling a used pole will be justified by its expected life. Where installation cost is high due to specific or local conditions it might be more economical to set a new pole and set used poles in locations where the installation cost is more moderate.

Sufficient records should be kept so that more accurate life expectancy of reused poles can be determined and the economy of retreating methods may be evaluated and compared. Suggested records to be kept include disposition of all poles by age groups, types of decay and/or mechanical damage of all poles inspected by age groups, location of standing retreated poles and type of retreatment, date the retreated pole was reinstalled, and date the retreated pole was removed and the cause of removal.

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This new, entirely different estimating guide has 200 completely worked out charts.

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This book is easy to use—it has no complicated mathematics or formulas to work over. You merely determine the nature of the wiring, check it in the BLUE BOOK OF ELECTRICAL ESTIMATING and there's your answer—it's the simplest estimating book ever written.

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This book was written by a successful electrical contractor and estimating engineer with over 20 years' experience. It has an entirely different method of determining estimates on wiring jobs. Electrical contractors, journeymen, architects, and engineers will find use for this book every day. Gives time required to do jobs along with complete labor charges in every state in the country. Check the PRODUCTIVITY of your men with this authentic, field tested book. Order this book now from your supplier at special introductory price of $8.25 or send coupon below.

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Send me the NEW BLUE BOOK OF ELECTRICAL ESTIMATING for 5 days free trial. I understand I may return the book within 5 days and owe nothing. If I keep it I will pay $8.25 plus postage for shipping.

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ADDRESS

TOWN ZONE STATE

☐ I enclose $8.25 to save shipping cost.

☐ Send C.O.D. I'll pay postman $8.25 plus C.O.D. fee on delivery.

(December 1960)

Know the law

(Continued from page 85)

the ceiling installation. He went to the premises, but could not find the parts that were supposed to have caused the fire, and as he stated: "That upset any investigation I could make because there wasn't anything for me to see . . . "

He stated the job was at least average, with nothing about it from a workmanship standpoint to which he would "normally take exception." He was unable to satisfy himself that it was an electrical fire, but could not discount the fact that it could possibly have been. He did not believe the fire started from the electrical outlet.

A deputy fire marshal with long experience testified for the plaintiff. He went to the premises two days after the fire. He said that after a fire it is impossible to tell if the circuits were faulty.

He could not determine the cause of the fire, but in his opinion the outlet box was the only place where the fire started, as this was the only place near the floor level that had a fire, and it travelled from the box up the wall to the attic. A photograph of the area supported this latter testimony.

He said a fire could start in an outlet box without an appliance being plugged in if a loose connection existed and that repeated vibrations such as those from passing vehicles, jet planes, or such, with arcing (sustained luminous glow) could generate enough heat to start a fire either in the insulation or in the plywood wall. He said an overloaded circuit could produce the same result.

He stated that the job had not been completed because on a finished job all joints are soldered, but he found some twisted joints in the boxes in the attic and ceiling of the kitchen.

It was on the basis of the above summarized evidence that the Court decided that the trial jury was justified in deciding that failure to make the installations in a workmanlike manner caused the fire.

Bare hand working

(Continued from page 69)

the new method this same job now takes but one-half manhour.

Mr. Sporn disclosed that the new method for handling live conductors with bare hands had been thoroughly lab-tested at voltages up to 380,000 volts and also had been proved safe during extensive field tests. The latter tests were recently carried out on both a 138,000-volt steel tower transmission line and a 34,500-volt wood pole transmission line in the Findlay District of Ohio Power by an Ohio Power crew.

The tests were witnessed by numerous engineering, operating, and safety officials assembled from various points on the seven-state AEP System.

Dual-range register

(Continued from page 67)

The meter disc shaft drives the worm wheel on shaft (1). Shaft (1) turns shaft (2) which turns shaft (10) the kilowatthour gear train and the pointed shafts (11) (12) (13) (14) and (15). Shaft (2) also turns shaft (3) which is the dual range shaft. Both shafts (2) and (3) have two gears and pinions which change mesh when the scale plate is reversed to change the range.

As an example of these steps, to change from one range to another range, the scale is reversed. The tab seen at the left (near the 0.1 graduation) depresses shaft (3) which is then put under spring tension. This action disengages a gear and mating pinion on shafts (2) and (3) and automatically engages a different gear and pinion on these two shafts. This change in ratios automatically corresponds with the graduations of the scale desired, due to the contour of the scale plate.

The dual range shaft (3) turns shaft (4) which turns the demand clutches on shaft (5) alternately depending on which clutch is engaged. Each clutch on shaft (5) turns its mating gear on shaft (6) when its clutch is engaged. Shaft (6) also has two pushers which work with the two corresponding clutches and push the demand pointer upscale to indicate the demand.

The time interval is established by the operation of a synchronous motor as it drives through a gear train to a cam which trips the clutches and returns the pointers to zero by its action on two sector gears. The operations are accomplished as follows: Crown gear shaft (25) is turned by the output shaft of the synchronous motor. Shaft (25) turns shaft (26) and the driving disc on this shaft turns shaft (27) which turns the time elapsed indicator shaft (30) and also has a driving disc which turns shaft (28). Shaft (28) drives the cam shaft (29). The cam on shaft (29) performs a dual function:

(A) It pivots a lever arm which rides in the center of the cam and engages a clutch for the interval. On the next interval the cam pivots the lever arm in the opposite direction and engages the opposite clutch.

(B) The top outer surface of the cam depresses a spring on the corresponding sector gear on shaft (7) and drives the pushers on shaft (6) to zero.

The cam action always returns the disengaged pusher to zero before the end of the interval and keeps the clutch open time to less than one second.

Banked secondary

(Continued from page 66)

ers in a group may vary from two to ten and in size from 10 to 50 kva. Our standard secondary wire size is No. 4 copper or No. 2 ACSR.

The transformers in a group are

Wanted: Manuscripts for publication

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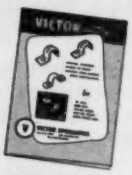

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never connected so that a switch in the primary line can open the primary between transformers.

Personnel protection

Operating personnel must be trained in the safety precautions to be used when working with banked secondaries. When a transformer fuse is opened, the primary of the transformer may still be energized from the secondary size.

At first, we tagged the cutouts on all transformers on banked secondaries to let the operator know it was banked. As more and more transformers were banked, the operators were instructed to treat all transformers as being banked and the use of tags was discontinued.

With the advent of the self-protected transformer designed for banked secondaries, another method of eliminating the disadvantages of fuses was available.

These transformers have two sets of secondary leads with thermally operated circuit breakers in each set. See Figure 7. One thermal element sees the total transformer load, but trips only one set of breakers. The other thermal element sees only the load going through its associated set of breakers.

The two sets of secondary leads are connected to opposite sides of a dead end in the secondary conductor on the transformer pole. The secondary is connected between transformers without a break.

In case of a fault, the breakers connected to the faulted secondary open and isolate the fault. The transformers continue to serve the secondary not in trouble. In case of an overload, one breaker will open and relieve the overloaded transformer. This transfers all of the load in one section of secondary to the breaker in the adjacent transformer which in turn opens and drops this section of secondary.

We tried a number of these transformers, but this method did not work too well on our secondary system. Our older residential areas have houses facing all four streets of a block. The secondary was installed in a grid which does not lend itself to the use of this type of transformer. They must be installed in a straight line or loop secondary only.

One disadvantage of this type of transformer is that it is not suitable for use in three-phase banks. It must be stocked in addition to standard transformers.

Because of these two reasons, we did not continue the use of this transformer.

In conclusion, I wish to emphasize again that the advantages of banked secondaries can now be realized without the disadvantages of solid secondary or fused junctions. Distribution engineers should take a new look at this means of improving the operation of the secondary distribution system.

Embossing tapes

(Continued from page 36)

operate the machine—the letter is dialed, a lever is gripped, and the tape is embossed.

This we find is much less expensive than calling in a painter or stenciling lettering on panels. Such designations as "Canopy Lighting Panel," "Canopy Lighting Contactor," "Project Office Shop Panel," and "Breaker Trough" are clearly indicated with these tapes. They adhere well to the panel surface, and there appears to be no deterioration with time.

Code questions

(Continued from page 33)

family dwelling, using the optional method of 220-7, a demand factor is permissible where four or more separately controlled space heating units are involved. Air conditioning must be computed at 100%.

Question: Is it the intent that these separate heating units be automatically or thermostatically controlled?

Answer: Yes. Separate for each room.

(14) Section 220-4(f). Assuming the name plate rating of the space heaters to constitute the largest load, the air cooling load would be omitted for calculation purposes. However since a demand may be applied to the heating unit loads, it is possible that the cooling load could impose the greater estimated load of the system.

Question: Under these conditions which should be used in the design of an electrical system—the heating or cooling load?

Answer: The highest, either cooling or heating, after final calculations are made.

(15) Section 516-2.

Question: Is the wiring in the paint spray booth, shown in the illustration, in accordance with this section? (Picture of booth was displayed.)

Answer: No.

Question: Are the fixtures and electrical equipment installed in

accordance with Section 516-3 (a,b,c)?

Answer: No.

Question: Are any fixtures presently listed by Underwriters' Laboratories for installation in paint spray booths?

Answer: No.

(16) Table 5 (fpn).

Question: In calculating the size of service raceway which includes a bare neutral grounded conductor, would the cross sectional area of the neutral be calculated as a bare or an insulated conductor?

Answer: Must use the dimensions for insulated conductors in Column 3.

(17) An opinion is requested on whether or not the Code should require that all branch circuits supplying lighting and fixed and portable equipment in, and around, swimming pools contain a "true" equipment grounding conductor.

Answer: A special technical subcommittee of N.F.P.A. has been appointed to study and submit recommendations covering the whole subject. Reports of accidents should be sent to the I.A.E.I. office for transmittal to the committee.

(18) Section 352-7.

Question: Are fiber bushings required on all surface metal raceway installations where the raceways enter terminal fittings?

Answer: No.

(Additional questions and answers will follow in January issue.)

Power tools essential

(Continued from page 31)

a special tool or piece of power equipment is bought for handling the job more efficiently. In recent years I had considered a trenching machine, particularly on a certain job when it would have been very useful. Its cost would have been $3,000, and the size of the job did not warrant purchasing it. We rented a trenching machine at a cost of $13.

No contractor can operate today without an investment in power tools and equipment. They are his means of doing an efficient job economically.

Generator under hood

(Continued from page 32)

nie admits that he can trace many jobs for wiring for electric ranges to his truck sign.

When he does wiring for ranges or air-conditioning, he never fails to talk to the owner about electrical heating. Other large contractors, from nearby metropolitan centers, also operate in the area. But none uses the aggressive efforts that Mr. Dennie employs to get his share of the growing volume, and to create interest in electrical living.

More all-electrical homes are found in the Jacksonville area than in any other community in the state, and Mr. Dennie sees a great future ahead for the contractor who promotes electrical living.

"Some day," he admits, "I hope to have a modern showroom, instead of the modest office I now have. In the meantime, my clean, freshly-painted trucks can help to carry my publicity in this power-conscious area. As I drive, my telephone number is seen four times on the sides of the truck.

"If I were a large contractor, with a fleet of trucks, I would make sure that at least one truck was set aside to be a signboard-on-wheels. A heavy-duty truck, used to transport bulky equipment, cannot be maintained in a sparkling condition. But a pickup truck that doubles for sales and for hauling equipment can be kept attractive.

"I am convinced that my trucks have a part in building good will for me."

Utility promotes

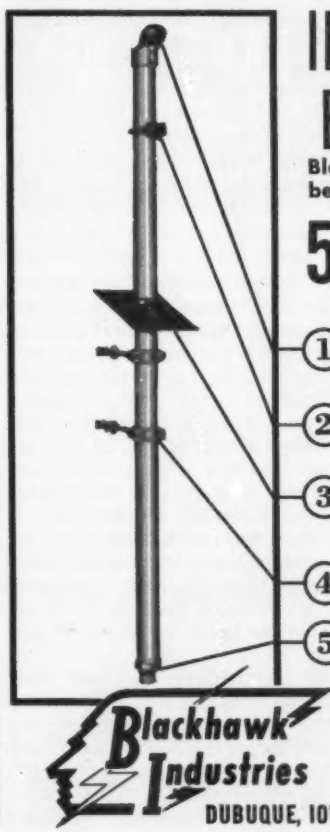
(Continued from page 34)

that thereafter power used by the air-conditioner takes the regular rate—about two cents instead of the special winter rate of one cent.

The company furnishes the service entrance conductors and its housepower box when a customer buys a heat pump or large resistance heater for use under the program. Of course, the owner stands whatever other wiring and equipment installation costs are involved.

TV show starts program

The company kicked off the program with a TV preview show on July 10 and utilized three television stations in its territory. A general news release to the 95 newspapers in the company territory and the display advertising program broke on July 18, with



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full-page copy in all daily papers. Smaller space went to all weekly and semi-weekly papers in the area. The newspaper advertising program will continue indefinitely.

In August the company launched a heavy "spot" schedule on radio and television stations to promote the new heating rate and to feature water heaters and heat pumps.

Office and company window displays throughout the area featured—and continue to feature—the program; truck cards and the company's full schedule of outdoor advertising carried the program.

An electric heating plan kit went to all managerial personnel throughout the territory, and kits went also to architects, contractors, and others who would be interested in the program directly or indirectly.

The company conducted district meetings in every district office, at which the program was thoroughly explained and kits were distributed. It held a special meeting in Corpus Christi for distributors of electric water heaters, heat pumps, and other types of domestic electric heaters. The meeting was aimed at explaining the complete details of the program, including the heavy advertising schedule, and how the program would favorably affect the distributors through heavier demand for electric water heaters and household electric heaters, including heat pumps.

During the various district meetings, a meter expert from the home office explained step by step how the change-over would work and exhibited a sample of the "lid" for use in making the switch.

The advertising program almost immediately aroused renewed interest on the part of electrical contractors in electric water heaters, heat pumps, and large resistance heaters, because the consumer advertising produced a lot of inquiries for the contractors. Any contractor who did not understand how the program worked had a man from the nearest office call on him and go over the details, particularly the one cent rate and how it reduced heating costs of the average home by about 50 per cent.

"We particularly noticed that manufacturers of heat pumps, electric heaters, and larger resistance heaters showed new and sudden interest in our territory," Mr. Gardner said. "They contacted the company for recommendations as to prospective distributors for their lines, and some sought additional data on the program."

The company does not merchandise appliances, but when called upon, it assists dealers and contractors in closing deals for major installations, and it wages a continuous program of merchandising, aimed at inducing the consumer to see his dealer or contractor for modern appliances. This campaign makes no exception to this company policy.

Moderation in buying

(Continued from page 30)

ing at our overhead on a job are the tools that have not yet paid for themselves. Through a process of ratio and proportion, we allocate an exact figure for tooling a job, taking into consideration the type and size of the job.

We also charge cost of maintenance and replacement of parts to a job. This is our method of charging tool costs to our job overhead when a tool has not yet paid for itself.

At first glance this may seem a very complicated way of charging tools. Others may find a straight percentage method more readily applicable. However, we have found our system of conservative moderation advantageous in giving us a competitive edge and getting us the job at a profitable price.

Right tools speed

(Continued from page 28)

The radio equipment is installed on six of Stone's 12 vehicles.

Stone Electric, of course, makes extensive use of power saws, jet line guns, power dies, electric hammers, hydraulic benders, power paint guns, masonry drills, hydraulic knockout punches, and virtually all other power equipment available to today's electrical contractor.

Training classes held

To train employees in the use of power tools—both to prevent personal injury and to preclude damage to the tools—Stone Electric holds classes on all new equipment in afternoons after work shifts. An hour is set aside for the classes and the men are given advance notice.

Factory literature that accompanies new tools is read carefully and instructions passed on both

orally and through demonstrations. After Stone electricians learn to use the tools according to factory instructions, then the company feels they can adapt them to special uses.

Maintenance and repair of tools are given particular attention. Upon return from a major job, all tools are checked, oiled, and cleaned. Preventive maintenance is the aim.

Tight control stressed

Tight control of tools and materials also is stressed. Tools are assigned to jobs by check number and returned the same way. For on-the-job use they are stored in 7- by 7- by 14-foot roller-type equipment houses. The company's annual deficit from theft and loss is less than one per cent.

Four custom-built trucks are loaded late in the afternoon prior to the next day's job. Employees report directly to the job site rather than the main office. Two full-time men check out tools and materials.

Mr. Stone, who has been in electrical contracting for 15 years and is president of the Birmingham chapter of the National Electrical Contractors Association as well as chairman of the joint apprenticeship committee, sums up his opinion of power tools: "If you're going for the larger, better jobs than have the tools to do the work, maintain them properly, and they'll pay for themselves in a hurry. With power tools a contractor can bid and complete 30 per cent more work."

Tool policies

(Continued from page 23)

and-down track arm had crosspiece "fingers" on which the fixtures could rest. The vertical track was adjustable for various ceiling heights.

Foot-operated switches raised and lowered the hoist. One man was used on the floor, one on the hoist. Fixtures were delivered in bulk, in a rack of trays which could be rolled around the floor.

Another large-job method used by Oklahoma Electric in industrial work is the practice of "rolling" fixtures into position.

For example, while working recently in a building area over 250 feet long, the crew worked from a fixed scaffold with a tracked, roller-type hanger. The time of moving a scaffold was thus eliminated, as fixtures were rolled down the track to the next installation point. The problem of getting around obstructions on the plant floor was eliminated, also.

Oklahoma Electric gives strong thought to its tool policies, and this has played no small role in the firm's growth and success on large job bidding.

Proper selection

(Continued from page 22)

serve to identify Gabrio electric tools at job sites, where they are kept intact in ten- by 20-foot job shacks or in locked gang boxes. It is the job superintendent's responsibility to see that men receive instruction in the proper use and lubrication of tools.

Mr. Gabrio employs no shop man except for an elderly electrician who periodically straightens out the crowded warehouse. "To me, a fulltime shop man would be a luxury," he explains. "We don't do enough small work to keep such a man busy. Larger units like pipe, panels, wire, and fixtures are shipped direct to the job and thus avoid warehousing. For small items, each job foreman simply calls the supply house."

While such tools as Ramset guns are checked periodically by factory representatives and one or two tools are pulled at a time so as to avoid slowing any job, the company's policy in the matter of needed repairs is to dispatch the unit to the factory's authorized service shop.

"It's a mistake to lump tools together for repair in a general shop," he says. "Chances are they don't stock all the parts needed for every make tool, which means they're bound to substitute parts of sub-standard quality and performance characteristics."

Everyone respects brains, and management knows that workers often come up with ingenious and money-saving ideas. The company accords these earnest consideration, and workers know that such suggestions lead to advancement in the organization.

Cable protection

When a recent job requiring interlocking aluminum cable dictated measures for its protection where the cable had to be held to a minimum radius in entering wiring troughs, a worker evolved a

gimmick fashioned from oak into two quadrants. Between them was placed a series of ¾-inch pipe nipples on four-inch spacings as rollers, and cable rolled effortlessly around the rollers and into the troughs, without a scratch.

Similarly, when it was necessary to raise a series of glass batteries to ceiling level, one worker came up with the idea of welding a steel boom to a floor-type hydraulic mobile jack similar to those used by garagemen to raise cars.

By pumping the jack handle, the boom raised the batteries, the jack and boom were rolled into position, and the batteries were then lowered to their location.

"Sure, that Rube Goldberg now languishes in the warehouse, but it saved us a lot of lugging and possible breakage. Best thing is, it only cost us around $35, and we charged it to the job."

Even better, the man who devised the novel unit knows that Mr. Gabrio considers such suggestions as the clue to discovering good men for key jobs in his organization.

Which is why the 30 men in the firm, like their boss, all "get into the act" in sharing Mr. Gabrio's enthusiasm for labor-saving, profit-making tools as the most efficient way to get things done and insure their steady employment.

Power tools help

(Continued from page 25)

"We have our job superintendent's time to consider," Mr. Petersen concluded. "With all their on-the-job details, it would be an imposition to burden them with keeping up with tools and equipment being checked in and out.

"Furthermore, the cost involved transferring tools back and forth would soon buy the necessary tools. When we buy new tools or equipment, the first job pays for them. If the job doesn't justify the expense, then surely we don't need them. If it does, we can't afford to be without."

Washington report

(Continued from page 8)

construction industry. He spoke at a recent AFL-CIO meeting.

Last year's Landrum-Griffin Act permits contractors to sign union contracts before hiring employees, but Rothman says that the Act does not let unions force contractors to sign pre-hire contracts. He quotes President-elect Kennedy, who helped write the Act:

"It was not the intention . . . to require the making of pre-hire agreements but, rather, to permit them; nor was it the intention . . . to authorize a labor organization to strike, picket or otherwise coerce an employer to sign a pre-hire agreement . . . ."

Rep. Barden (D-N.C.), now retired, but then chairman of the House Labor Committee, agreed with Sen. Kennedy.

The Landrum-Griffin Act also lets building trades contractors and unions sign agreements that:

Require union membership following seven day's employment (instead of 30 days as it is in other industries).

Give unions the right to refer prospective employees to employers.

Establish qualifications for employment (like seniority or length of time in area).

Trade unions can strike legally for such agreements, Rothman said.

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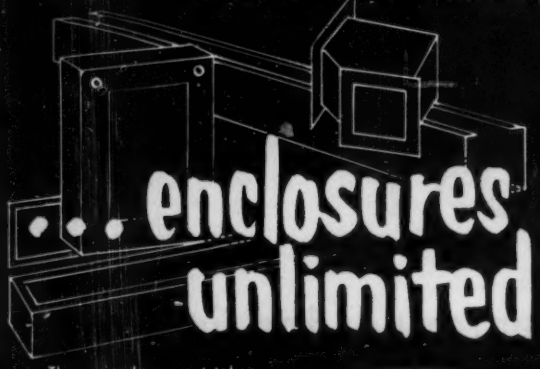

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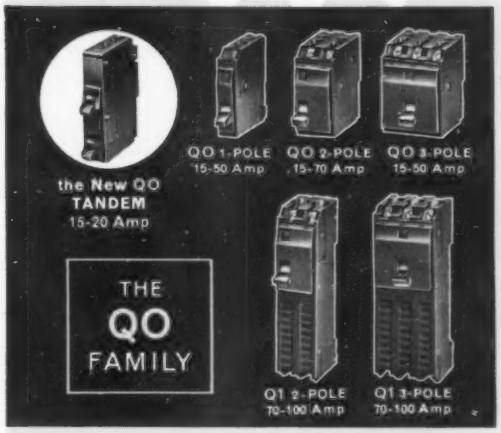

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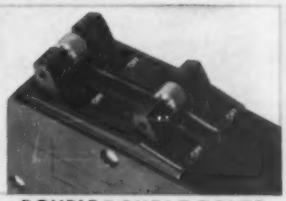

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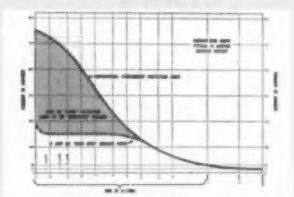

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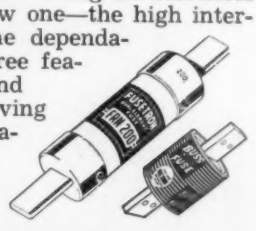

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